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# China Report

## AGRICULTURE

No. 175

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## CONTENTS

ABSTRACTS

I. GENERAL INFORMATION

BUYING AND SELLING OF PRIVATE LAND

Fujian County

OW110243 Fuzhou Fujian Provincial Service in Mandarin 1120 GMT 10 Nov 81

[Text] The (Puqi) production brigade of the (Quqi) commune in Liancheng County strengthens leadership over housing construction by commune members. The 29 new houses with 204 rooms built this year in the brigade have not occupied any cropland. With the development of agricultural production in recent years, the member of the (Puqi) brigade have generally increased income and many commune members and cadres have built new houses. In order to protect cropland, the brigade set up a housing construction leading group. It has explicitly stipulated that new houses can be built only on hillsides, wasteland or the foundations of old houses; that no one is allowed to build houses on cropland and this stipulation applies to both collectives and individuals. It has also stipulated in explicit terms that individuals who want to build new houses must submit their application for democratic discussion by cadres and members of production teams and for examination and approval by the housing construction leading group of the brigade, that they must build the houses on hillside land or wasteland allocated to them.

(Hua Jinfa), a commune member, at first planned to build a house in a field. The brigade quickly talked him into changing his mind and helped him in selecting level land on a hillside near the village and using the earth on the slope to build walls. In this way, he saved labor and material and occupied no cropland. (Hua Jinfa) was greatly satisfied.

The brigade-run brewery at first planned to build a brewing house on 2 mu of cropland. The housing construction leading group helped it in making a new plan, selecting hillwide land and buying, for some 400 yuan, a commune member's small lot, site of an old house, for the site of the brewing house. [Bing yong liao si bai duo yuan gou mai liao yi hu she yuan xiao kuai lao fang ji di zuo chang zhi 1670 3938 0055 0934 4102 1122 0337 6356 6314 0055 0011 2073 4357 0765 1420 1040 5071 2075 1015 0966 0254 1681 0968] So the brewery has not occupied any cropland either.

This year, eight brigade and team cadres have also built new houses. All of them took the lead in abiding by the brigade's stipulations and built new houses on the foundations of their old houses. (Hua Jintao), secretary of the brigade party branch, built a six-room house on the foundation of his old house and did not occupy collective land.

## Hunan County

HK120317 Changsha Hunan Provincial Service in Mandarin 1100 GMT 11 Nov 81

[Text] The Yongshun County CCP committee recently dealt severely with the illegal behavior of a few people on (Aiping) brigade of (Aiping) commune in buying and selling land. (Aiping) brigade is located near the county seat. Since 1979, 43 instances of buying and selling land have occurred on this brigade, involving a total area of 28 mu, including 18 mu of paddy land. There are two reasons for this state of affairs. First, some commune members were unable to clarify the relationship between responsibility systems and ownership systems. They erroneously held that to institute responsibility systems meant to divide up the land and go it alone, with everyone owning his own land and doing what he liked with it. Secondly, a few cadres and workers in county units arbitrarily bought land to build houses, heedless of the party policies.

On discovering this problem, the Yongshun County CCP committee promptly sent people to carry out investigations, and also held a gathering of cadres and personnel concerned of couty units. The gathering made the following announcements: buying and selling land is illegal, all previous buying or selling or land by units and individuals is void, and the land is to be immediately taken back into public ownership; the money that changed hands in these transactions is to be immediately confiscated and turned over to the state; the land recovered in this way is to be handed over by the brigade to peasant households with large numbers of laborers and little land, who will be made responsible for cultivating it; work is to be stopped on all house construction on such land; where houses have already been built, the commune will set a dead line for moving out; some houses will be sold back to the public at low prices; those cadres and peasants who have bought and sold land must conduct self-examination and be criticized, educated, or disciplined according to the seriousness of the case and their attitude.

CSO: 4007/81

SYSTEM OF RESPONSIBILITY IN WATER CONSERVANCY PROJECTS EXPLAINED

Beijing NONGYE JINGJI WENTI [PROBLEMS OF AGRICULTURAL ECONOMICS] in Chinese No 9, 23 Sep 81 pp 42-44

[Article by Song Lusheng [1345 7627 3932] and Guo Shaoyu [6753 4801 4416]: "Reforms in the Administration and Management of Water Conservance; Jindongnan Prefecture in Shanxi Province Institutes Survey of System of Responsibility for Water Conservance Management"]

[Text] In order to meet the developing needs of water conservancy management, and the new situation following institution of various systems of responsibility linking compensation to production, Jindongnan Prefecture in Shanxi Province has courageously carried out a reform of its water conservancy management, promoting a system of responsibility for water conservancy management throughout the province, which has effectively increased the economic benefits of existing water conservancy projects. As of the present time, 62 percent of the area's more than 19,000 water conservancy projects have instituted various systems of responsibility for management of water conservancy.

Proposal for System of Responsibility

Since the founding of the Chinese People's Republic, the irrigated area of southeastern Shanxi has expanded from 45,000 mu to the present 1.2 million mu in a remarkable achievement. Nevertheless, as a result of the damage done by "leftist" mistakes, for a long period of time problems have existed in failure to care about economic effectiveness in water conservancy work. Since the beginning of the 1960's, the state has annually disbursed about 30 million yuan for investment in water conservancy in the region, and over the past 20 years grain output in the region has increased by more than 700 million jin for an annual incremental increase of more than 35 million jin. For each jin increase in grain output, however, investment in water conservancy by the state alone has amounted to 0.80 yuan. One of the reasons for this state of affairs has been blind and foolhardy action, waste of money and manpower, and unconcern about economic effectiveness, which has resulted in towering waste. Another reason has been the "eating out of a large common pot", and "drinking out of a large common kettle" in management, and poor management over a long period of time, which has greatly reduced the economic effectiveness of projects. Since the Third Plenary Session of the 11th Party Central Committee, the burgeoning in the farflung rural villages of various forms of a system of responsibility linking compensation to output has raised new problems for water conservancy management. Problems arising at that time are as follows: Communes and production brigades leveled electric irrigation station irrigation ditches, locked up facilities and

used them no longer. Some communes and brigades divided water conservancy projects and equipment so they could not be used for irrigation. Following institution of the linking of output to the workforce and contracting for production with individual households, some communes and brigades fought over water. No one looked after the water conservancy facilities, and there was so much trouble no one could water his fields properly.

In view of these circumstances, the Jindongnan Prefecture CCP Committee, government administrative offices, and water conservancy departments conducted thoroughgoing investigation and study, promptly summarized the experiences of places like Gaoping County in instituting a system of responsibility for water conservancy management, and used this experience as an important integral component in the institution and perfection of various forms of a system of responsibility for agricultural production. Last winter and this spring, three separate special meetings were held to study and make assignments of work in promoting a system of responsibility for water conservancy management.

Experience has shown that institution of a system of responsibility for water conservancy management is a necessity in meeting new situations in water conservancy management in the farflung rural villages following institution of various systems of responsibility linking compensation to production, and like the various systems of responsibility for agricultural production, it has been welcomed by the broad masses.

Forms of a System of Responsibility

Starting with the fundamental characteristics of water conservancy work, and adhering to the principles of level by level and centralized management, in its system of responsibility for management of water conservancy, Jindongnan Prefecture adapted general methods to local situations, adopting the following forms:

1. Level by level contracting; placing responsibility on individuals; calculation of remuneration for fixed quotas; and awards for overfulfillment or penalities for underfulfillment. Implementing these systems of responsibility were large and medium size catchments, irrigation areas of more than 10,000 mu, and large and medium size machinery and power irrigation stations, for the most part. Currently, projects throughout the prefecture on which these forms of a system of responsibility have been instituted number 583. These are places like the Fushan irrigation area in Gaoping County, which comprises 1 reservoir of 2 million cubic meters capacity, dams at two places, 1 1000-meter long water diversion tunnel, and three irrigation ducts totaling 31 kilometers in length. The benefitted area amounts to more than 12,000 mu and involves 4 communes, 22 production brigades, and 104 production teams. they have established an administration bureau in the irrigation area; the communes have set up management stations; the production brigades have set up management sections; and production teams have set up contract irrigation units in four levels of management. They have set up level by level contracting, various norms, placed responsibility on individuals, and formulated a criteria for awards and penalties, with awards for overfulfillment and penalities for underfulfillment.

2. Contracting with teams and units, and calculation of compensation being linked to quality of project management, number of times each mu is irrigated, and wetlands output. Instituting this kind of a system of responsibility are usually projects managed by communes and brigades. Right now this form of a system of responsibility

is in use on 5,220 projects throughout the prefecture. In the case of Beishidian Commune in Jincheng County, for example, 16 people have been specially organized to manage the commune's 5 water conservancy projects. Wages for these management personnel fluctuate according to how much output from wetlands is above or below the 600 jin per mu level. For fields producing less than 600 jin per mu, wages are 34 yuan per month. For between 600 and 800 jin, wages are 36 yuan per month. For more than 800 jin per mu, monthly wages are 38 yuan. The advantage of this method is that it links compensation paid to management personnel to how well the fields are irrigated and the amount of output, in a change from the former practice whereby all anyone carred about was opening the sluice gates to release water and not caring about earnings.

3. Specialized contracting and fixed quota contracting for work. Mostly it is production brigade and production team individual water conservancy projects and human and animal potable water projects that institute this system of responsibility. Currently more than 3,500 projects in the prefecture have instituted this form of a system of responsibility. The Weijiayao Production Brigade of Caocun Commune in Wuxiang County formerly irrigated an area of more than 350 mu from a single electric irrigation station, but because management was not good, the wetlands came to be farmed as drylands; money was spent and labor wasted, but no increase in output resulted. Last year this brigade contracted management of this electric irrigation station to two commune members, designated them responsible for 500 man-days of labor. In order to cover expenditures for electricity, maintenance and repairs, and subsidies for the electric irrigation station, the production team set aside three mu of wetlands for which it made work contracts, requiring that should expenditures for the irrigation station exceed output from the three mu, no restitution would be made, but 40 percent of any surplus would go to the two managers. Last year, these two commune members not only did a good job of irrigating 350 mu of wetlands, but also grew mulberry saplings on the three mu of "station support fields" earning more than 1,200 yuan thereby. After meeting the station's expenses, they had a surplus of 300 yuan. Last year this brigades 150 mu of wetland wheat produced yields of 100 jin per mu; the 90 mu of autumn fields produced yields of 200 jin per mu, and there were 110 mu of mulberry saplings. Earnings amounted to 46,000 yuan. People said that overall contracting for the water conservation work and the three mu of "station support fields" brought increased output and increased earnings for the entire brigade.

4. Contracting for individual projects with full awards and full penalties. Instituting this system of responsibility are diversified operations and small tracts of wetlands belonging to production teams in irrigation areas, for the most part. Currently 983 projects in the prefecture are using this form of a system of responsibility. The Fushan and Pinghe irrigation regions in Gaoping County have instituted specialized contracting for earnings and expenditures of units in the irrigation area such as diversification, cement unit, automobile unit, maintenance and repair unit, fish in raising unit, and farming unit in a system of responsibility of total award and total penalty. Xibao Brigade in Songcun Commune, Changzi County contracted with four old commune members and three women the management of a pump well (powered by a water wheel) and the 20 mu of wetlands it serves, which the seven people farmed. The brigade stipulated that the contractors would be responsible not only for all expenses involved, but also for payment each year of 4,000 yuan, one workpoint being recorded for each 2.50 yuan. If they earned more, it would be theirs, but if they earned less, they would have to make it up themselves.

5. Specialized production, entreprenurial management, specialized tasks, specialized contracting, and institution of profit sharing or overall contracting of work for output value. Mostly hydropower stations, fish farms, and users of water for industrial purposes have instituted this form of a system of responsibility. There are quite a few communes and brigades in the prefecture that have linked production to specific workers or contracted production with individual hosueholds. Some have trial operated water conservancy irrigation and hydropower production enterprise companies. Qudi Brigade of Duanshi Commune in Qinshui County instituted the linking of output to individual workers, after which it put into effect with water customers the providing of water a fixed number of times according to needs, calculating the charge for water on this basis. This both conserved water and increased economic income, and resulted in expansion of the irrigated area. This spring, during the great drought, there was no drought on the brigade's 660 mu of wetlands. The Chixiang Brigade of Sanjia Commune in Gaoping County instituted enterprise management for a potable water project for people and livestock, and instituted calculation of water costs for agricultural use of water by households with whom production had been contracted, and for use of water for industrial sideline occupations. Their annual earnings came to 1,500 yuan, and an after-expenses surplus of more than 200 yuan. Use of these measures solved the drinking water problem for 1,700 people in the village, and made optimum use of economic benefits. In the fight against drought this spring, water was supplied to contracting households for the dibbling of 800 mu of corn, for the watering of 30 mu of wheat, and for the watering of 20 mu of ground to be planted in the fall.

Advantages of the System of Responsibility

Jindongnan Prefecture put into effect various forms of a system of responsibility not very long ago. Further summarization of experiences and steady perfection and improvements are still required. However, the advantages accruing from institution of these systems of responsibility have already been clearly revealed:

1. Surmounts the situation of eating out of a "large common pot" in management; gives expression to the policy of greater returns for greater work. This method has increased managers' sense of responsibility; has fired up their enthusiasm; and has promoted the tapping of potential and the fitting out of water conservancy projects. After Changzi County instituted a system of responsibility in water conservancy management, in the course of a single spring season more than 100,000 meters of permanent irrigation ditches were renovated; 55 old wells were restored to operation; 350 pieces of water conservancy equipment, which had been broken for many years, was repaired; and more than 3,500 mu of wetlands were revived. Liujia Production Brigade of Beicheng Commune in Changtai County had once had 32 sets of water pumping equipment, more than 18 sets of which had been lost or damaged as a result of not assigning people to care for them, unclear responsibility, and bad management. After institution of a system of responsibility for water conservancy management, they assigned persons to machines, maintained accountings for each machine, and linked calculation of compensation to output. They restored to operation and fitted out all of their pumping equipment for a 100 percent rate of operation, and took care of all of their 2,400 mu of wetlands.

2. Reduces expenditures and Cuts Down on Various Costs. Irrigation costs declined. Statistics from Gaoping County, which instituted a system of responsibility in water conservancy management fairly early, showed a general decrease last year by about 50 percent in management costs, maintenance and repair costs, electricity costs, and subsidies for the county's water conservancy projects. Last year the Hougu

Production Team of Shuidong Commune in Pucheng County contracted to commune member Sang Xulin [2718 4872 2651] and his wife management of a water conservancy pumping and storage project. Under the identical conditions that obtained during the previous year, water costs for the irrigation of land so many times per mu dropped from 1.39 yuan to 0.72 yuan, a decline of 49 percent.

3. Promotes Development of Diversification in Water Conservancy. Because of the development of diversification in water conservancy, numerous water conservancy project management units have realized self-sufficiency with a surplus in management expenses. The three irrigation areas in Gaoping County in Fushan, Danhe, and Xuhe, each of which has more than 10,000 mu, formerly depended on the state to subsidize their management costs. Last year, however, they instituted specialized contracting and the linking of calculation of compensation to output value in their diversified cement plant and fish farm units, achieving, as a result, self-sufficiency and surplus in the management expenses of the three irrigation areas. Last year income from diversification in the Yongjin irrigation area of Licheng County amounted to 200,000 yuan. In addition to achieving self-sufficiency in expenditures for management costs, the area was able to use some funds for maintenance and repair of the project.

4. Has Fully Used Qualified Specialists. Formerly, Taibei Production Brigade of Tinghepu Commune in Licheng County was engaged in a "mass rally war" devoting large numbers of people to the construction of water conservancy. Last year, following the fitting out of the Yongjing irrigation ditch and branch ditches, and institution of specialized contracting, the production brigade increased the number of "indigenous experts" and made improvements in work procedures involving running water for concrete, for a doubling in work efficiency to earn an award for excess output. Formerly the Fushan irrigation area in Gaoping County lacked qualified scientific experiment specialists, which impaired scientific irrigation. Last year following institution of a system of responsibility, work tasks and functions were divided up and three people contracted for management of the irrigation experiment station. They assigned specific people to specific functions, diligently studied, and ran repeated tests, and within a year, they set irrigation norms for corn, millet, and wheat crops, excellent experimental results being obtained in scientific use of water. They also wrote a summary of their scientific experiments, making a contribution to increased agricultural output.

5. Benefits Implementation and Perfection of Various Systems of Agricultural Responsibility and Arouses Commune Member Initiative in Development of Small Water Conservancy Projects. Some mountain cabins in Qinshui County put into effect contracting for production with individual households after which commune members themselves set to work to dig mountain springs, sink wells for use during drought, and install 48 animal-powered water wheels for 48 small water conservancy projects. At Lichuan Commune in Jincheng County, after 32 households of commune members made special contracts for the production team's vegetable garden, they then resorted to various means to enlarge the wetland area by 32 mu. A commune member in Liushu Brigade, Guolin Commune, Changzi County made a specialized contract for 12 mu of economic crops after which he personally dug a well to turn 12 mu of drylands into wetlands.

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EROSION CONTROL IN NORTHWEST CHINA REPORTED

## Loess Plateau Erosion Control

Taiyuan SHANXI RIBAO in Chinese 23 Sep 81 p 2

[Text] The problem of how to control erosion of the loess plateau is a major one of concern to millions upon millions of people. In late August, the Ministry of Forestry held loess plateau afforestation on-site meetings in Ji County in Shanxi Province and in Chunhua County in Shaanxi Province. These conferences exchanged experiences on problems of how to do a good job of building the loess plateau shelter forest system, and discussed future tasks and methods.

### Serious Problems The Loess Plateau Faces

The loess plateau is located in the middle reaches of the Yellow River where soil erosion is a serious problem that has come down through history. In the more than 130 counties (or banners) that are part of the loess plateau area, the area of erosion is approximately 280,000 square kilometers from which 1.6 billion tons of silt annually flows into the Yellow River. If the cultivated layer of farmland is calculated as being 30 centimeters thick, this means that the equivalent of 5 million mu of the cultivated layer of farmland is annually washed away as silt. It is estimated that every ton of loess contains 23 kilograms of nitrogenous, phosphate and potash nutrients. Extrapolated, this means that the silt that is annually washed away contains 36 million tons of fertilizer. This situation has wreaked havoc with production conditions on the loess plateau. At the same time, large quantities of floodwaters flush the silt downstream where it accumulates in reservoirs and watercourses, creating serious threat to areas in the lower reaches. The great dikes of the Yellow River that stretch for a thousand li grow higher and higher year after year creating a passive situation of "the greater the height the greater the danger, and the greater the danger, the greater the height." In Shanxi Province alone, reservoirs built along the Yellow River system annually lose about 50 million cubic meters of their water storing capacity. Because of the constant scouring of the surface soil of farmland on the loess plateau, soil fertility is thin and outputs low. In order to solve their food problem, the masses have no choice but to indiscriminately cultivate hillsides, do widespread farming for meagre harvests. As a result, a vicious cycle of, "the greater the cultivation, the more meagre, and the more meagre, the greater the cultivation."

The 28 counties in the western mountains of Shanxi Province that are a part of the loess highlands account for one-third of the province's total land area, and one-

third of the province's total land area, and one-fourth of cultivated land in the province. The population here amounts to 14 percent of the total for the province, but grain output amounts to only one-seventh of the total for the province. For a long time, the standard of living of the masses here has been the lowest in the province.

Many reasons account for this state of affairs. Looked at objectively, most important is the serious erosion, and the major reason for the erosion is the sparsity of forest plant cover. Natural secondary growth forests in all the loess plateau amount to 28 million mu, and this plus 20 million mu of man-made forests totals 49 million mu, or only 5 percent of the total area. Therefore doing a good job of bringing the loess plateau under control and vigorous advocacy of planting trees and growing grass to control erosion and to build a fine ecological system not only relates to building of the four modernizations and improving the livelihood of the people in this region, but also relates to the prosperity of countless generations of posterity.

Vigorous Planting of Trees and Grass to Control Erosion

Both the CCP Central Committee and the Sate Council have always been extraordinarily concerned about bringing the loess plateau under control. Some achievements have been made during the past 30 years or more in bringing the loess plateau under control, and a certain amount of experience has been accumulated. However, the task of fundamentally transforming the loess plateau landscape and controlling erosion is still a formidable one.

During the past 30 years, three different attitudes and methods have existed as to how to bring under control the loess plateau. These have been manifested in three different results.

First was a lack of confidence in being able to bring the loess plateau under control, a feeling that nothing could be done to bring it under control, and adoption of an attitude of letting everything slide. Governed by this mentality, people were at the mercy of nature and continued to clear hillsides to farm. As a result, erosion became increasingly worse and the people's livelihood became increasingly hard.

Second was a recognition that the loess plateau ought to be brought under control. A great deal of money has been spent since the founding of the People's Republic in this regard, and quite a few problems have been built. These have achieved a certain amount, but in terms of large areas, erosion has not been controlled by any means, and some of these projects were even a waste of money and manpower.

Third was sufficient confidence and correct methods in bringing under control the loess plateau. This method used comprehensive control, which meant biological measures, for the most part, augmented by engineering projects. During the past more than 30 years, in places that have adhered to this method, created forests and grew grass, erosion has been virtually brought under control, and a panorama of lush forests and bumper crops, and the flourishing of domestic animals has taken place.

The large amount of representative data presented in these conferences show that by planting forests and growing grass on the loess plateau, not only is it possible to conserve the water and the soil, protect water sources, regulate the climate, and improve the ecological environment, but also a major way to develop the economy of mountain regions and make the peasants of mountain regions become prosperous with all possible speed. In order to accomplish this, it is necessary to adhere to a program of construction of "using forests and livestock primarily in comprehensive development of agriculture, forestry, and livestock raising, change from widespread farming for meagre yields to little farming for high yields, to change the vicious cycle into a benign cycle. In the past, numerous impoverished mountain regions lopsidedly emphasized "taking grain as the key link, devoting efforts to grain year after year when they could not get grain, but now placing the emphasis of production on forestry and the livestock industry, and getting grain contrary to expectations. This principle merits our deep thought.

The Inspiration that Ji and Chunhua Counties Have Given

How can erosion be brought under control and the ecological environment improved on the loess plateau? Ji County in Shanxi Province and Chunhua County in Shaanxi Provicce have provided valuable experience in this regard.

Ji County is located on the loess plateau in western Shanxi on the southern end of the Luliang mountain range. The county has a total area of 17.77 million square kilometers. The land is traversed by ravines, and ridges of hills undulate across it. The county annals record that during the last years of the Ming dynasty, Ji County had tens of li of lush forests," "pine and cypress grew in forests, and the trees towered toward the sky." During the regin of Shunzhi in the Qing dynasty, forest fires constantly occurred, and following the advent of the Chinese Republic destruction of the forests and the clearing of land increased to a serious degree. Following Liberation, the habit of the masses of steady clearing of land continued unabated for a long time, turning remnant forests into bald mountains. Following the Third Plenary Session of the 11th Party Central Committee, the County CCP emancipated mentalities, eradicated "leftist" influence, and adapted general methods to local situations to establish a policy of "use of forests and livestock primarily for all around development of agriculture, forestry, and animal husbandry" to build output. Following a survey of natural resources and readjustment of the structure of agriculture, a land use plan of "five parts forests, three parts grasslands, and two parts divided for fields" was enacted; and a system of responsible for forestry production was promptly established and perfected bringing about a great development of forestry production throughout the county and a 26 percent forest cover rate.

Chunhua County is located in the northern part of Xianyang Prefecture in Shaanxi Province and north of the Wei River on the southern edge of the loess plateau. In 1949 the entire county had only 17,000 mu of natural second growth forests. Beginning in 1973, they devoted attention to the planting of trees to create forests as a basic measure for the transformation of the loess plateau, aroused the masses, and for 7 consecutive years launched large scale tree planting and afforestation campaigns. By the end of 1980 the afforested preserve area amounted to 251,000 mu. Along a highway embankment, farmland shelter forests run for a total distance of 1,600 kilometers; trees planted in the four besides [beside houses, villages, roads, and water] number 7.57 million, and the forest cover rate has increased from the

former 3.5 percent to the present 18.8 percent. In addition, a combination of biological and engineering measures have been used to control an erosion area of 257 square miles, which is 27 percent of the total erosion area.

In the course of the conferences, people saw with their own eyes the vast tracts of man-made forests planted in recent years in Ji and Chunhua counties. The fragmented and broken ravines have become covered with lush green trees. The erosion situation handed down by history has begun to be brought under control here. The idea of "soil not going down the mountains and water not going through the ravines is in process of gradually becoming a reality. The realities of these two counties have enlarged people's vision, and they realize that there is hope that the loess plateau can be brought under control.

New Circumstances and New Problems

As the system of responsibility for agricultural production is established and perfected, problems in establishment of a system of responsibility in forestry have been placed on the agenda A look at the problems reflected in these two conferences shows that in numerous places serious situations of wanton cutting, reckless denudation and destruction of forests to clear land for farming have taken place because systems of responsibility for forestry were not given prompt attention. This is a new situation and a new problem to be faced in the building of the forestry industry.

Establishing and perfecting a system of responsibility for forestry production has become a priority matter in building the forestry industry. In the process of building a system of responsibility, what are the new problems requiring study and solution?

One is the problem of caring for existing forest trees. Most of the existing mountain forest tracts and principal forest belts have been collectively built and are administered by communes and brigades. After the way of administering agricultural production was changed, and particularly in places that instituted the "double contracts" [contracting with individual households for production or for work], the phenomenon appeared of "contracting for output in agriculture but no one being in charge of forestry." Many commune and brigade forest farms tended toward a state of disintegration. This problem requires urgent study and solution. At the present time, some forest farms have no income as yet, or else income is miniscule; however, in long range terms, these forest farms are a great wealth. If they are botched, the longterm welfare of commune members will be damaged. In regard to this problem, some places have used the method of using agriculture to nurture forestry, and using sideline occupations to nurture forestry, by which is meant withdrawl of a certain amount of expenses from total income from agricultural byproducts for compensation to personnel specializing in forestry. In so doing, distributions of earnings to commune members for any given year will naturally be reduced to a greater or lesser extent, but once the forestry industry begins to earn, it will become something on which commune members may rely to become prosperous. This requires indoctrinating the broad masses of commune members in the relationship between immediate benefits and longterm benefits in order to preserve existing collective forest farms. Small tracts of scattered trees may also be contracted out for care, using a system of division of increase in value, or proportional division of earnings. No matter the method adopted, it is important that discussions be held

with the masses and the will of the masses be respected so that existing forest trees will be really taken care of.

Second is the problem of administration and management of newly built forests. For this there are currently several different forms of solution. The first is unified planning and household by household participation in afforestation, rights to the forests reverting to production teams, and earnings divided up, or else supplemental wages paid. The second is sharing of responsibility for afforestation among the workforce, the collective recording workpoints and paying compensation with rights to forests reverting to the collective. The third is contracting afforestation of barren hills and slopes to specialized households or to a combination of households, combining afforestation and management with a proportional division of earnings, the largest proportion going to commune members. Fourth is unified planning but designation of some barren hills and slopes for afforestation by individual commune member households, ownership going to whomever does the afforestation. No matter the form adopted, there has to be unified planning, unified leadership, and stirring of the masses at a unified time in a concentration of forces to complete afforestation quotas for any given year. Control of the loess plateau is a great and formidable task. Without realistic and unified planning, and without very good organization of forces in all quarters, piecemeal efforts will fail.

Establishment of a system of responsibility for production means the emancipation of production forces, not only the emancipation of agriculture, but the emancipation of forestry and other industries. Attention to the key link that a system of responsibility for forestry is, and linking the development of forestry production to the personal welfare of commune members can arouse commune members to the maximum extent to plant trees and create forests, and can bring about the best situation in the development of forestry since the founding of the People's Republic.

## Silting of Hydropower Dam

Beijing GUANGMING RIBAO in Chinese 23 Oct 81 p1

[Article by Li Wei [2621 5588]

[Text] Editorial Department

Recently this correspondent visited the Longyang Gorge Electric Power Station construction site. The Longyang Gorge Electric Power Station is China's second largest hydroelectric power station, only the Gezhou Dam being larger, and it is also the first hydroelectric power station on the upper reaches of the Yellow River. Flood waters and silt are the two great dangers for this power station. Following their survey in August and September of this year of the Koko Nor region, Wang Limo [3769 4539 2307] and [0702 4423 3123], engineers in the agricultural zoning office of the "Three Norths" forest shelter area have recently made the following proposals. After winning victory over this year's massive flood, beginning of work to build a shelter forest belt in Baili Prefecture on both shores of the Yellow River up above the power station so as to further protect the Longyang Gorge Electric Power Station, and to extend its productive life following construction.

On the basis of on the ground observations, they recommended: In the Chakayanchi region in the eastern Tsaidam Basin, every year there is a large amount of sandy

soil, which moves from the northwest to the southesst over a distance of 400 li carried along on damaging winds from the Shazhuyu river valley at the foot of the mountain along Koko Nor, and between Aniwayan Mountain and Longyang Gorge, a distance of 100 li along the north bank of the Yellow River, it is drawn into the river. At present, sand dunes exist in clusters on both banks of the Yellow River. Not only are 1 million mu of grasslands in the two counties of Gonghe and Guinan along the banks of the river desertified, but an extremely large amount of soil has increased the silt content of the river water, and has gradually silted up reservoirs. This must be promptly brought under control. They recommended widespread planting of shrubs in the sandy area, and the building of many shelter forest belts in the four hundred li sandy bllt, first of all along both shores of the Yellow River. They recommended the building of a 100 li long shelter forest tract from Aniwayan Mountain to the Longyang Gorge to intercept the sandy soil, to moderate sand damage, and to protect the reservoirs.

The two engineers noted that in Hainan region [of Chinghai] the main reason for the increasingly serious desertification is, in addition to the blind clearing of land for agriculture in the 1950's, overgrazing that destroys ground cover and promotes degeneration of the grasslands and desertification. Consequently it is necessary to determine in a rational way the amount of grasslands to be prohibited to pasturage for diligent protection of the grasslands. It is also necessary to actively find ways to solve the fuel problems for peasants and herders and to prohibit the digging up of plants that grow in the sand, as well as to prohibit clearing of land for agriculture. The problems of desertification of the Hainan region's grasslands is fairly conspicious in Chinghai Province. Control of this sandy tract and restoration of the ecological balance will not only benefit the reservoirs, but will also be of major significance for agricultural and livestock industry production. The shelter forest belt that the Shazhuyu Commune in the sandy belt has already built can protect 12,000 mu of farmland. It has had very good results and merits promotion.

## Ningxia Afforestation Efforts

Beijing GUANGMING RIBAO in Chinese 23 Oct 81 p 1

[Article by Wang Guanghua [3769 1684 5478]

[Text] People's procuratorial organizations at all levels of the Ningxia-Hui Autonomous Region have promptly investigated and tried, in accordance with pertinent laws for the protection of forests, all cases involving the denudation or poaching of forests, punishing principal offenders, and indoctrinating the broad masses to put a stop to the evil tendency of destroying forests.

During the first half of this year, procuratorates at all levels in the autonomous region have heard more than 110 cases involving destruction of forests. This is more than three times the number of such cases heard last year. Nigxia Province is one of the provinces of China that has a paucity of forests, the forest cover rate being only 2.79 percent. Since last year, the autonomous region, municipal, and county people's procuratorates have earnestly intensified forest inspection work. First of all they organized the entire forest of inspection cadre and police for conscientious study of pertinent forestry policies and ordanances, as well as how representative cases were handled. Among cadres and the masses, they launched

widespread propaganda and indoctrination in protection of the forests. With the support of the County CCP Committee and the County People's Government, the County Procuratorate of Jingyuan County in the Liupan mountain region acted in coordination with departments concerned to organize work teams to go into communes and brigades both to check out and verify cases of destruction of forests, and to engage in propaganda work. They investigated and handled, in accordance with law, eight instances of serious destruction of forests. They also helped the grassroots level formulate pledges to protect forests, and to establish systems of care and protection with very good results.

In cases of destruction of forests for which there was not sufficient evidence for investigation and prosecution, they actively worked together with forestry, and other units concerned to settle them, shirking nothing but making every effort to reduce or halt the destruction of forest resources. In order to do a good job of routine forest investigation work, acting in accordance with pertinent regulations, they established, in forest areas and in counties where forest inspection duties were fairly heavy, on-the-job forestry inspection personnel, and they hired a group of forestry inspectors and messengers to supervise implementation of the "Forest Law" and other pertinent ordinances and policies, and to report to the authorities or bring to light cases of denudation and poaching of forests for a good job of protecting the forests.

9432
CSO: 4007/59

## BRIEFS

ANHUI PREFECTURE AGRICULTURAL OUTPUT--This year Chuxian prefecture, Anhui Province, reported a total grain output of 3.7 billion jin, 15 percent over the 1980 figures; an output of 260 million jin of oil bearing crops, 77 percent over 1980; a 62 percent increase in cotton output; and a 460 percent increase in output of cured tobacco. The per capital contribution of commercial grain throughout the prefecture was 171 jin in 1979, 202 jin in 1980 and an estimated 300 odd jin in 1981. The per capita distribution income from the collective was 82 yuan in 1979, the year when the production responsibility system was put into effect, 202 huan in 1980 and an estimated 300 odd yuan in 1981. [OW161207 Beijing XINHUA Domestic Service in Chinese 1254 GMT 10 Nov 81]

CSO: 4007/81

## BRIEFS

SOYBEAN PRODUCTION--Suihua County, Heilongjiang Province, reaped a bumper soybean harvest this year on its 465,000 mu of soybean fields. Per-mu yield is expected to be 250 jin, 20 percent higher than the 1980 level, and output is expected to be 110 million jin, a record. The county is expected to sell 75 million jin of soybeans to the state, more than 4 times the 1980 figure. Each peasant will have his income increased by 51 yuan from soybean production. [SK301117 Harbin Heilongjiang Provincial Service in Mandarin 1100 GMT 29 Oct 81]

CSO: 4007/81

## BRIEFS

PREFECTURE AGRICULTURAL HARVEST--Huaiyin Prefecture in Jiangsu has reaped an all-round bumper harvest of agricultural crops this year. The total output of grain has reached 7.5 billion jin, topping last year's by some 800 million jin. [OW141451 Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 10 Nov 81]

CSO: 4007/81

JIANGXI HOLDS EMERGENCY MEETING ON AUTUMN HARVEST

OW061413 Nanchang Jiangxi Provincial Service in Mandarin 1100 GMT 5 Nov 81

[Text] On the morning of 5 November, the Jiangxi Provincial People's Government held an emergency meeting, attended by responsible comrades of all departments, to study the question of autumn harvesting. The meeting called on rural cadres and masses throughout the province to mobilize on an emergency basis to successfully combat wet weather and reap a bumper agricultural harvest this year.

Now is the time for autumn harvesting and winter planting. However, affected by the winds from the southern mountain range, the whole province is facing one of the longest unbroken spells of wet weather on record. As a result, our autumn harvesting and winter planting are unfavorably affected.

According to the weather forecast, we will still have overcast weather and rain throughout the province for the next 3 to 5 days. The meteorological station, after analyzing meteorological data accumulated in past years, says that wet weather will prevail in the first 20 days of November.

To successfully combat wet weather and guarantee a bumper agricultural harvest, the meeting stressed that the following work must be done in all localities without fail:

1. Leading cadres at all levels must go to grassroots units to study with cadres and the masses, concrete solutions, to overcome wet weather. It is necessary to resolutely prevent and overcome the negative mood of letting things drift.

2. It is necessary to dig trenches to drain water and see to it that, on rainy days, no water accumulates in the fields and that, when the rain stops, the fields become dry. It is necessary to prevent the late rice seedlings from rotting. It is necessary to keep winter crops from rotting.

3. It is necessary to race against time on sunny days and concentrate the labor force on harvesting autumn crops. While harvesting crops, we must bring into full play the initiative of both the collective and the commune members. It is necessary to organize commune members to coordinate and help each other. It is necessary to advocate threshing in the fields and make every effort to avoid piling crops in the open air.

4. It is necessary to make full use of vacant houses or use agricultural sheeting and straw to build makeshift shacks so that wet crops can be kept dry. It

is necessary to work hard to protect crops from heat, sprouting and rotting. It is also necessary to select and keep fine seeds of late rice.

5. All departments must be of one heart and one mind and spare no efforts to help people in rural areas with autumn harvesting and winter planting, thus making contributions to reaping an overall bumper agricultural harvest this year.

CSO: 4007/81

## BRIEFS

SOYBEAN PRODUCTION--Yushu County in Jilin Province has collectively planted 827,000 mu of soybeans. Many peasants have also planted soybeans on their private plots. Soybean output from the collective soybean fields is expected to be 126.8 million jin and that from private plots is expected to be 30 million jin [Changchun Jilin Provincial Service in Mandarin 2200 GMT 26 Oct 81 SK]

AUTUMN HARVEST--Jilin Province has scored marked achievements in its autumn harvest. As of 5 October, the province had harvested 34.14 million mu of various crops --65 percent of all crops to be harvested. [SK070704 Changchun Jilin Provincial Service in Mandarin 1100 GMT 6 Oct 81]

AGRICULTURAL TECHNOLOGY--Since the beginning of 1980, Jilin Province has sponsored 6,700 training classes on agricultural scientific technology, and some 300,000 persons have been trained. As a result, the acreage sown with fine seeds has expanded to 17 million mu, an increase of 83.6 percent over 1978. Meanwhile, 1,784 agricultural and breeding stations employing 3,122 scientists and technicians have been restored and established. [SK070704 Changchun Jilin Provincial Service in Mandarin 2200 GMT 6 Oct 81]

TRACTOR PURCHASE--From January to August 1981, rural areas of Jilin Province bought 3,742 tractors, an increase of 9.8 percent over the corresponding 1980 period. In Yushu County alone, peasants bought 343 tractors last spring and 220 tractors in the autumn. [SK290930 Changchun Jilin Provincial Service in Mandarin 2200 GMT 26 Oct 81]

CSO: 4007/81

## BRIEFS

GRAIN PRODUCTION--In Liaoning Province, Tieling Prefecture has reaped bumper harvests for 4 consecutive years. This year the prefecture's marketable grain to be turned over to the state is expected to exceed 1980's record level of 1.93 billion jin. The prefecture will not slacken its efforts to prepare for next year's farming after bumper harvest. By 25 October, the prefecture had plowed 2 million mu of farmland, 37 percent of the acreage to be plowed, afforested 55,000 mu and completed 1 million cubic meters of earth and stone work for farmland improvement projecst. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 29 Oct 81 SK]

CSO: 4007/81

# LIMITATIONS ON LAND USE ON NORTHWESTERN SHANDONG PLAIN EXPLAINED

Dalian ZIRAN ZIYUAN [NATURAL RESOURCES] in Chinese No 3, Sep 81 pp 42-51

[Article by Guo Huancheng [6753 3562 2052] and Xu Zhikang [1776 1807 1660], Geography Institute, Chinese Academy of Sciences: "Problems in the Rational Use of Land Resources on the Northwestern Shandong Plain"*]

[Text] The Northwestern Shandong Plain is located in the lower reaches of the Yellow River and encompasses a total of 33 counties and cities in Liaocheng, Dezhou, and Huimin prefectures. The land area totals 37,835 square kilometers, or 24.7 percent of the total land area of Shandong Province. Here the plain is vast and land resources abundant, making it the major grain and cotton growing region of Shandong Province. However, as a result of the serious damage done by drought, flooding, and alkalinity, agricultural production here has long remained in a state of low and inconsistent yields, and it is one of the low yield areas in both the province and in the country. In order to study the problems of rational utilization of land resources in the Huang-Huai-Hai plain, a survey of the region was undertaken in 1979, which preliminarily charted the soil resources situation, utilization characteristics, and existing problems, and which also put forward suggestions for rational use of land resources.

## I. Analysis of Conditions Affecting Use of Land Resources

### 1. The land is generally flat, but hills, slopes, and depressions intersect it.

The Northwestern Shandong Plain is an alluvial plain of the Yellow River. The land area is vast; the terrain is low and flat, and the soil layer thick. It is part of the Huang-Huai-Hai Plain. The topography tilts from the southwest toward the northeast, and elevation above sea level ranges from about 40 meters to 10 meters. The fall of the land surface is 1/7,000 to 1/10,000, and the relative difference in height of the land surface is 1 to 5 meters. Because the Yellow River has changed its course, burst its banks, and silted up numerous times throughout history, numerous hillocks, slopes, and depressions with a height difference of no more than 3-5 meters have formed (see Table 1). Generally speaking the high hillocks are concentrated to the west of the Majia River and

*Also participating in this work were Comrade Qu Shiying [0575 0013 5391] of the Geography Institute of the Chinese Academy of Sciences, and Comrade Li Shude [2621 2885 1795] of the Shandong Teachers College.

Table 1. Table Showing Make-Up of Landforms on Northwestern Shandong Plain

| Types of Landforms | Total Cultivated Land | Hilly Land | Elevated Siltland Along River | Gentle Slopes | Depressions |
|---|---|---|---|---|---|
| Area (10,000 mu) | 2,983.47 | 616.68 | 166.99 | 1,546.8 | 653 |
| Percentage of Cultivated land | 100 | 20.7 | 5.6 | 51.8 | 21.9 |

in the area of the old river course where the terrain is 3 to 4 meters higher than its two sides, and 10 to 30 kilometers wide, this area accounting for about 20.7 percent of the cultivated land. The land is elevated and the soil loose, composed mostly of sandy loam, which is easily drained and pervious to water. Underground water is stored fairly deeply; water quality is fairly good; and there is no threat of waterlogging or salinity. Well irrigation is well developed and population is numerous relative to cultivated land. This is where the cream of agricultural production for the entire area is located. The elevated silt lands along the river are, for the most part, in the area along the two sides of the former watercourse of the Yellow River where they form a swath that amounts to about 5.6 percent of the cultivated land. This soil is largely loam; underground water is about 3 meters below the soil surface; the soil is infertile, not endangered by waterlogging or alkalinity, and is seriously parched. The gradually sloping land lies between the old watercourse and the present channel of the river. It is a broad, large area, amounting to about 51.8 percent of the total cultivated land, and is composed mostly of loam. The top of the slopes is made up of light loam soil, and has generally not been hurt by waterlogging or alkalinity. The bottom of the slopes are made up of medium loam and heavy loam, and have been damaged by alkalinity and salinity. Aside from the trough shaped depression along the river, most of the depressions are located in the relatively low-lying areas that intersperse the high land, forming an area of about 21.9 percent of total cultivated land in the region. The lay of this land is low; draining of water from it is difficult; and water readily collects in it making the soil sticky and heavy. Damage from waterlogging and alkalinity is fairly severe. This is the major area of low yields. Changes in the hilly, slope, and depression topography of the Northwestern Shandong Plain directly affects the distribution of soil and water conditions in the space, differences in the drought-stricken, waterlogged, and alkaline areas and the degree to which these areas are damaged. The masses say, "The hills are dry; the depressions waterlogged; and the slopes alkaline." This aptly explains the relationship between the topography and dryness, waterlogging, and alkalinity (see Table 2).

Table 2. Relationship Between Micro Landforms and Drought, Waterlogging, and Alkalinity

| Types of Land-forms | Drainage Conditions | Salt Content (%) | Underground Water | | Degree of Alkalinity, Salinity | Drought, Waterlogging & Alkalinity Damage |
|---|---|---|---|---|---|---|
| | | | Depth (Meters) | Degree of Mineralization (Grams/liter) | | |
| Hilly land | Good | < 0.1 | > 3.0 | 0.5 - 2.0 | None | Drought |
| Gradual slopes | Not easy | 0.1-0.2 | 2.0-3.0 | 2.0 - 5.0 | Light | Drought, waterlogging and alkalinity |
| Depressions | Difficult | 0.2-more than 2.0 | 0.5-2.0 | 5.0-15.0 | Fairly heavy | Waterlogging, alkalinity |

2. Fairly Abundant Amount of Heat; But Fairly Frequent Drought and Waterlogging Damage

This region has a temperate monsoon climate in which the amount of heat is fairly abundant. Accumulated temperatures are fairly high (≥ 10°C accumulated temperatures of 4,000 - 4,500°C), and a frost-free period that is fairly long (210 days), making it suitable for the growing of cotton, which likes warmth, and also making it capable of satisfying the needs of wheat, and autumn crops in a two crop per year system. However, the rainy season varies greatly, and quantity of evaporation is greater than quantity of precipitation. Annual precipitation averages 600 millimeters, 60 to 70 percent of it being concentrated during the summer (the 3 months of June, July and August). In other seasons, precipitation is scant, and they are dry. During springtime, in particular, the quantity of precipitation amounts to only 12 percent of the amount for the entire year, and amount of evaporation is 8 to 10 fold greater than amount of precipitation. "Spring drought, summer waterlogging, and autumn drought again," are major characteristics of the climate of this region. Spring is the crucial growing season for wheat when jointing, heading, flowering, and coming into milk occurs; the lack of water very greatly impairs its growth and output. In summer, precipitation is concentrated and of great force; however, because of the undulating microtopography, water does not drain away easily, creating waterlogging, which impairs the growth and output of late autumn crops (such as corn and millet), and cotton. Late autumn drought primarily affects the sowing of wheat on time.

3. Soil Is Thick, But There Are Striking Differences in Distribution From Place to Place

The mother material for the soil in this region is deposits from the overflowing of the Yellow River. It may be divided into sandy, loam, and clay in terms of its properties. The sandy soil accounts for 10 percent; the loam for 65 percent, and the clay for 25 percent (see Table 3). Because of the separating that the

Table 3. Soil Texture Area Structure of Northwest Shandong Plain

| Type Texture | Total Cultivated Land | Loan and Arenaceous Soil | Clay Soil | Sandy Soil |
|---|---|---|---|---|
| Area (10,000 mu) | 2983.47 | 1935.75 | 740.02 | 262.7 |
| Percentage of cultivated land | 100 | 65.0 | 25.0 | 10.0 |

Yellow River and its tributaries does, distribution of sediment follows clear laws as well. The masses say, "When the current is fast, it is sand; and when slow, it is silt," and "sand in the hillocks, but clay in the depressions." In general, the sandy soil is distributed on both sides of the old course of the Yellow River and in channels where the Yellow River has overflowed or broken its banks. The sandy soil is light, and individual grains are coarse making it friable. But since it lacks structure, it has poor water and fertilizer retention properties. It does not stand up against drought, is low in fertility, and generally has an organic content of 0.18 to 0.24 percent. Consequently, during the late stage of crop growth, it frequently runs out of fertility and yields decline. The masses called it "business land," because they can't get anything out of it unless they make an expenditure. The area of loam soil is large and distribution widespread. This includes sandy soil, light loam, medium loam, and heavy loam soils, most of which are distributed on the near gradient level between streams and sluggish rivers. The structure of the soil is spongy, and friability good, making it suitable for sustained cultivation. The nutrients in the soil are not numerous, however, organic content being 0.6 to 0.8 percent. The clayey soil is distributed in the depressions in the terrain, where streams flow sluggishly, and where extensive damage has been done by waterlogging. The soil layer is tightly compacted and has poor porosity. Water, fertility, air, and heat in the soil are extremely imbalanced. The soil is both easily waterlogged and easily parched, and its fertility is low. The organic content runs around 0.5 percent. However, in this area, the soil contains soluble salts in an amount of about 0.1 percent. Under conditions of intense evaporation, the salts readily percolate to the top of the soil surface with water, accumulating there to form salinity and alkalinity. Surveys show an area of about 9,544,800 mu of saline-alkaline soil, amounting to 32 percent of the total cultivated area. About 75 percent of the saline-alkaline land is inland, and about 25 percent of it is along the seacoast. Inland alkaline-saline lands are concentrated along the edges of depressions and at the bottom of slopes, where the underground water table is high, water quality poor, movement of salt in solution intense, and capillarity strong, causing salt accumulations on the soil surface and poor crop growth. On the basis of quantity of salt content and rate of keeping a full stand of seedlings growing, this soil is classified as light, medium, or heavily alkaline (see Table 4). The soil of light salinity and alkalinity is located at some distance from the sea, and is entirely used for the growing of crops. Salt content of this soil is 0.2 - 0.4 percent, and the rate of keeping a full stand of crops growing in it is better than 70 percent. Corn grows in it with difficulty, but growth of sesbania, cotton, and sunflowers is normal. Moderately alkaline-saline soils are fairly close to the sea, and have

a salt content of 0.5 to 0.7 percent, and a rate of keeping a full stand of crops of between 50 and 70 percent. Crops do not grow well in it, and it cannot be used unless it is improved through lowering the salt content. The heavily alkaline-saline soils near the seacoast have a salt content of 1 percent or more, and a rate of keeping a full stand of crops of less than 30 percent. They are not suitable for the growing of crops.

Table 4. Composition and Distribution of Saline-Alkaline Land on the Northwestern Shandong Plain*

| Item \ Prefecture | Total for All Prefectures | Liaocheng Prefecture | Dezhou Prefecture | Huimin Prefecture |
|---|---|---|---|---|
| Total cultivated area (10,000 mu) | 2983.47 | 870.10 | 1102.80 | 1010.57 |
| Alkaline-Saline Land | | | | |
| Total area (10,000 mu) | 954.48 | 145.00 | 288.35 | 521.13 |
| Cultivated land as a percentage of total area | 32.0 | 17.0 | 26.0 | 52.0 |
| Within the Saline-Alkaline Area | | | | |
| Light--Area (10,000 mu) | 386.70 | 72.50 | 123.40 | 190.80 |
| Saline-alkaline land as a percentage of total area | 41.0 | 50.0 | 43.0 | 37.0 |
| Medium--Area (10,000 mu) | 317.11 | 40.84 | 80.58 | 195.69 |
| Saline-alkaline land as a percentage of total area | 33.0 | 28.0 | 28.0 | 38.0 |
| Heavy--Area (10,000 mu) | 250.67 | 31.66 | 84.37 | 134.64 |
| Saline-alkaline land as a percentage of total area | 26.0 | 22.0 | 29.0 | 26.0 |

*The prefecture water conservancy bureaus provided (in 1978) most of the data on the table for the saline-alkaline areas.

4. Water Resources Are Good, But Their Distribution Is Unbalanced

Survey shows that surface water in the region accounts for about 59.3 percent of total volume of water, and underground water accounts for 40 percent. Most of the surface water is in the Yellow River, which in most years averages a flow of 46.8 billion cubic meters.[1] Even in dry years, it carries 27.6 billion cubic meters of water. In most years, its volume of water in times other than flood stage averages 23.9 billion cubic meters. The salt content of the water is 0.2 to 0.5 percent, making it suitable for use in irrigation. However, the Yellow River has a high silt content, transporting an average of 1.2 billion tons of silt annually.

1. Taken from "Shandong Agricultural Geography," compiled by Geography Department, Shandong Provincial Teacher's College, 1977-1978.

Each cubic meter of water contains 25.55 kilograms of silt. Because it contains so much silt, accumulation of silt in waterways is serious. The entire region has a dynamic storage capacity [0520 0328 6852] of 4.1 billion cubic meters, wells on which serve an area of 17,401,600 mu, or 58.2 percent of the cultivated land. In its area distribution, water is fairly plentiful on both shores of the Tuhai River and the Yellow River, and to the south of the Xiaoqing River, and water quality is very good, mineralization being 1 gram per liter, making it suitable for irrigation. In the broad area between the old course of the Yellow River and the river itself, the hydrology is complex; the quantity of water contained and its distribution are inconsistent; the abundance of water is poor; and mineralization is 2 to 5 grams per liter, making it unsuitable for agricultural irrigation. Because of the effects of the alternating sea and land, and mineralization (> 5 grams per liter), the region along the seacoast is not suitable for irrigation (Figure 1).

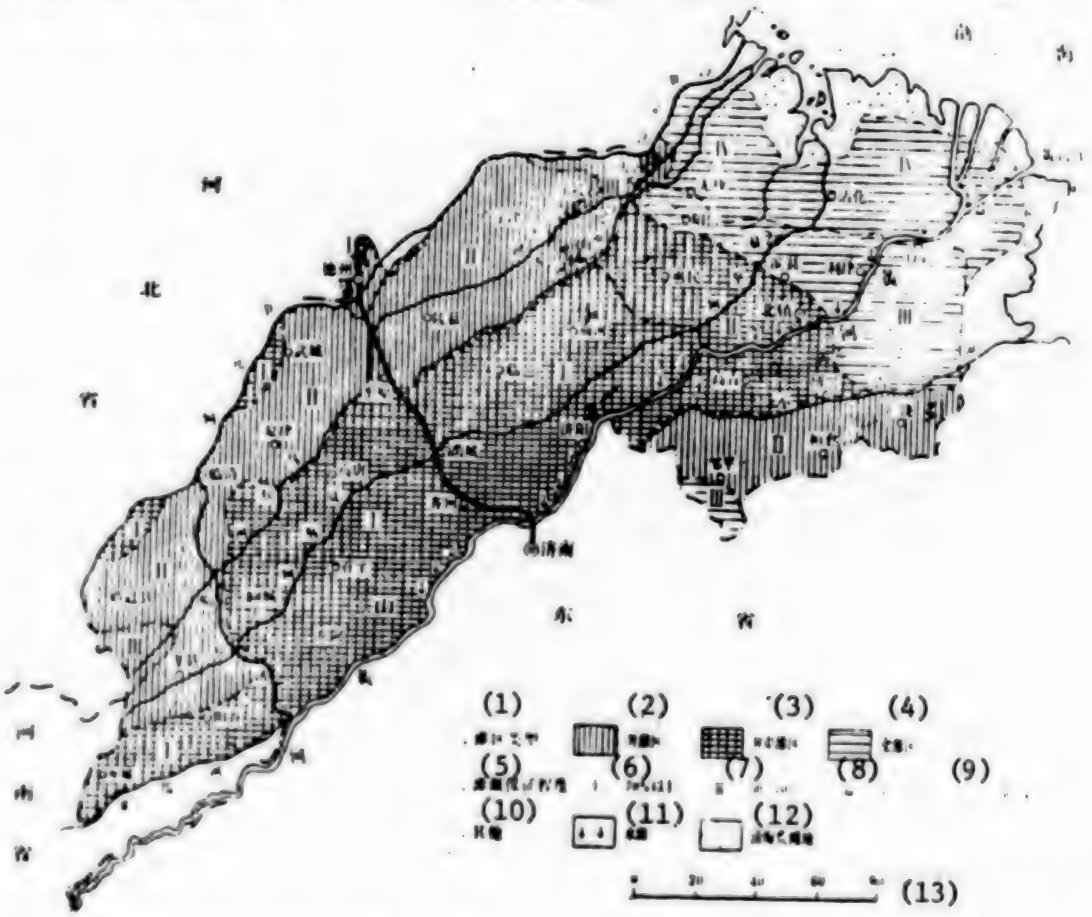


Figure 1. Map Showing Agricultural Later Conservancy Conditions on the Northwestern Shandong Plain

Key: (1) Type irrigation system
(2) Well irrigation system
(3) Well and ditch irrigation system
(4) Ditch irrigation system
(5) Extent of assured irrigation
(6) More than 70 percent
(7) 50-70 percent
(8) 30-50 percent
(9) Less than 30 percent
(10) Other
(11) Wetlands
(12) Barren beaches along seacoast
(13) Kilometers

Major Current Problems Existing in This Area's Water Resources: First is seasonal imbalance with much rainfall in summer and a large volume of flow in rivers, and little rainfall in spring (March-May) with a little flow. For example, between 31 May 1975 and 27 June 1975, the Yellow River stopped flowing twice for a total of 19 days, impairing water use for agriculture. Second is regional imbalance with the south getting more rainfall as a general rule, and the north getting less; inland areas getting more, and seacoastal areas getting less. Survey shows Huimin Prefecture lacking water most, getting about half of total needs. Dezhou Prefecture lacks about one-seventh of its water needs; and Liaocheng Prefecture's water and soil resources are close to balance. The imbalance in distribution of water resources posed objective requirements for transferring water within the region and for diverting water from outside the region. Third is imbalance in use. An analysis of general survey data from the Shandong Provincial Water Conservancy Bureau for 1973 shows a 72.5 percent rate of utilization of water from wells for irrigation, the medium size irrigation area being 32.5 percent, and the large size ditch irrigation area being only 23.0 percent. In the well irrigation area, in particular, because of the overdensity of pump wells and the excessive pumping of water, underground reserves are inadequate, causing the formation of "funnels" in some places, impairing use of water for agriculture.

Comprehensive analysis of the natural condition of soil resources in this region shows a flat terrain, varied types, a deep layer of soil, moderate climate, and fairly good water resources favoring full use of soil resources and further development of agriculture, forestry, and livestock raising. On the other hand, the irregular topography and clear differences in macrolandforms, directly impair collection and drainage of surface water. Changes in soil character and underground water, plus the "spring drought, summer waterlogging, and more drought in late fall," intensify damage to this area from drought, waterlogging, and alkalinization, thereby impairing full use of soil resources, with the result that agricultural production has long been low and inconsistent.

## II. Utilization Characteristics and Existing Problems for Soil Resources

Soil resources are fairly plentiful on the Northwestern Shandong Plain, and the utilization rate is fairly high. Results of this survey of land utilization rate shows the current structure of land utilization on the Northwestern Shandong Plain to be as follows: Cultivated land is 52.57 percent of total land area; forestlands account for 5.0 percent; pasturelands account for 2.68 percent; water surfaces account for 8.56 percent; wasteland amounts to 11.16 percent; villages, hamlets, cities, and towns occupy 11.65 percent; transportation arteries take up 3.77 percent; plants and mines use 1.45 percent; and 3.16 percent is used for other purposes. (See Table 5 and Figure 2).

The table shows current land use to be characterized as follows:

1. Predominantly cultivated land with little land used for forests or pasturelands; structure of land utilization fairly unitary.

In 1978, the region had 29,834,700 mu of cultivated land, or more than half the total area. Forestlands and pasturelands were few, the two together accounting

Table 5. Present Structure of Land Use on the Northwestern Shandong Plain (1978)

| Item — Types of Soil Use | Area (10,000 mu) | Percentage |
|---|---|---|
| Total land area | 5675.25 | 100 |
| Cultivated land | | |
| Total | 2983.47 | 52.57 |
| Highland cotton and grain high yield areas | 616.68 | 10.86 |
| Gentle slope grain and cotton moderate yield areas | 1546.80 | 27.26 |
| Depression area of low grain yields | 653.0 | 11.51 |
| Highland and riverflats oil crop, grain, forestry and fruit areas | 166.99 | 2.94 |
| Forestland | | |
| Total | 283.75 | 5.0 |
| Shelter forests | 156.65 | 2.76 |
| Economic forests | 84.40 | 1.49 |
| Brush and sparse woods | 42.7 | 0.75 |
| Pastureland | 152.0 | 2.68 |
| Water surfaces | | |
| Total | 485.76 | 8.56 |
| Ponds | 51.25 | 0.90 |
| Waterways | 426.61 | 7.52 |
| Lakes | 7.9 | 0.14 |
| Villages, hamlets, cities and towns | 661.04 | 11.65 |
| Transportation arteries | 214.08 | 3.77 |
| Plant and Mining land | | |
| Total | 82.20 | 1.45 |
| Oilfields | 50.00 | 0.88 |
| Saltworks | 32.2 | 0.57 |
| Wasteland | | |
| Total | 633.66 | 11.16 |
| Sandy wastes | 18.2 | 0.32 |
| Low-lying alkaline wastes | 123.06 | 2.17 |
| Coastal wastelands | 422.4 | 7.44 |
| Beaches | 70.0 | 1.23 |
| Other | 179.29 | 3.16 |

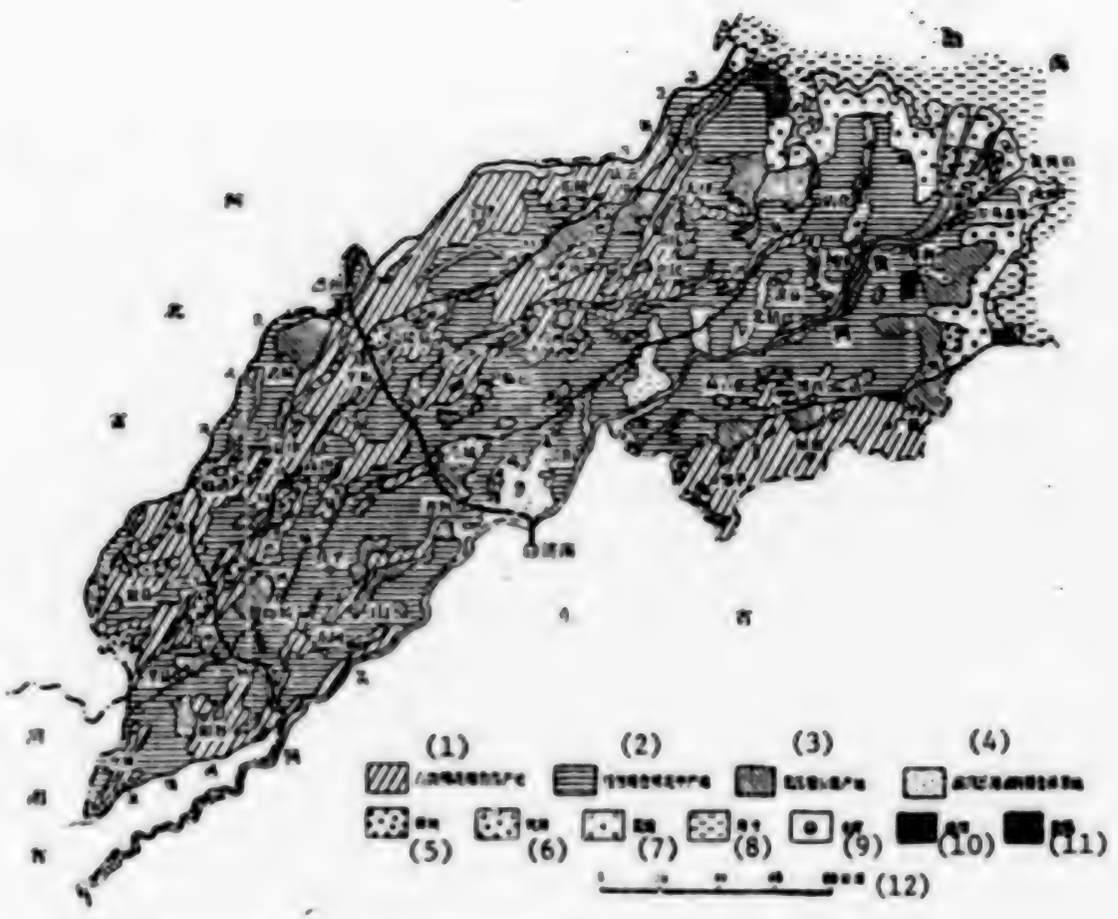


Figure 2. Map Showing Soil Use on Northwestern Shandong Plain

Key:

(1) High hill cotton and grain high yield land
(2) Gentle slope moderate yield grain and cotton land
(3) Low-lying low yield grain land
(4) High hill and shore land growing oil bearing crops, grain and forests
(5) Forestland
(6) Pastureland
(7) Wasteland
(8) Beaches
(9) Reservoir
(10) Oilfield
(11) Saltworks
(12) Kilometers

for less than 10 percent. This land utilization structure was also reflected in output value in which output value from cultivated crops amounted to between 70 and 80 percent of total output value from agriculture. Forestry amounted to between 3 and 4 percent; and the livestock industry accounted for between 7 and 11 percent. The soil utilization type is predominantly cultivated land. Distribution of cultivated land gradually tapers off from inland toward the seacoast. In Liaocheng Prefecture, 67.5 percent of the land is cultivated, but in Huimin Prefecture at the mouth of the Yellow River, cultivated land amounts to only

39.3 percent of the total. In Wudi, Zhanhua, and Kenli counties, only about 20 percent of the land is cultivated. The difference in the proportion of cultivated land in these cases both reflects the degree of reclamation and cultivation of wasteland, and also reflects the potential for further expansion of the cultivated land area. Conversely, forestlands and pasturelands increase the farther one moves toward the seacoast from inland. Land suitable for forestry and pasture is considerable, and forestry and livestock production is fairly good. Forests are distributed mostly in a triangle formed by the old channel of the Yellow River, the Dasha River, and the Yellow River. The area is not large; distribution is quite scattered; and the ground cover rate is low.

2. Multiple Crop Indices Fairly High With Grain and Cotton Predominating

Most of the cultivated land in this region is used to grow grain crops and cotton. The cultivated grain area amounts to 66.2 percent of the total cultivated area, and is from 70 to 80 percent in some places. Cotton fields occupy 15.7 percent of total cultivated land, and more than 30 percent in some places. Cottonfields and cotton output amount to 51.2 percent and 40.1 percent respectively of the province's total. This is Shandong Province's main cotton production base. In the distribution of grain, there is also a changing pattern from inland to the seacoast, and from the highlands to the slopes and to the depressions, with the grain growing area as a proportion of total cultivated land gradually increasing from 50 percent to about 80 percent, while the cotton growing area as a proportion of total cultivated land gradually declines from 25 percent to less than 10 percent, a small number of counties that are low-lying and seriously waterlogged (such as Wudi County) growing virtually no cotton at all (Table 6). With regard to crop distribution, in general, the uplands grew a lot of cotton, wheat, and corn, while the sandy soil grows peanuts and potatoes. Except for cotton, from which one crop a year is harvested, mostly wheat and corn are grown in two crops each year. On the slopes, mostly wheat, corn and millet are grown, while on high slopes cotton is grown in a two crops per year and three crops every 2 years system. In the depressions, wheat, soybeans and gaoliang are grown in a three crops every 2 years and 1 crop each year system.

This region's multiple cropping index increased rapidly, and to a fairly high proportion. Because production conditions were relatively poor during the period immediately following Liberation, the multiple cropping area was small, the multiple cropping index being about 120 percent, and mostly a system of one crop each year or three crops every 2 years was practiced. By the 1960's, as a result of emphasis given to the growing of high yield crops, the area devoted to wheat and corn rapidly expanded, and 80 percent of wheatlands became multiple cropped for a multiple cropping index increase to 150 percent, and a gradual change from three crops every 2 years to predominantly two crops every year. In the 1970's, inappropriate emphasis was given to "take grain as the key link," and there was continued increase in the multiple cropped grain area, the multiple cropping index climbing to from 150 to 170 percent. Because multiple cropping was too high, fertilizer inadequate, and the soil only used without being nourished, soil fertility dropped. At the same time, because of the excessive emphasis on diverse high yield crops, corn and potatoes squeezed out some drought-resistant and waterlogging-tolerant crops such as soybeans, gaoliang, millet, and food grains other than wheat or rice. A comparison of Liaocheng Prefecture in 1978 and 1949, for

Table 6. Relationship Between Cotton Distribution and Natural Conditions on the Northwestern Shandong Plain*

| Type of land | Soil quality | Damage from drought | Grain-fields as a proportion of cultivated land | Per mu grain yields (jin per mu) | Cotton-fields as a percentage of cultivated land | | Representative counties |
|---|---|---|---|---|---|---|---|
| River beaches, highlands and hills | Sandy loam and Mixed soil | Drought | 58.26 | 430 | 26.6 | 44 | Linqing, Xianjin |
| | | | 51.52 | 329 | 30.81 | 28 | |
| Gentle slopes | Loam, and Slightly clayey soil | Drought, waterlogging, alkalinity | 64.60 | 445 | 16.80 | 38 | Shen Linyi |
| | | | 62.57 | 425 | 21.30 | 20 | |
| Low-lying land | Clayey soil and Alkaline soil | Waterlogging, alkalinity | 72.82 | 380 | 10.95 | 16 | Leling, Wudi |
| | | | 86.82 | 241 | 0.77 | 22 | |

*Statistical data in chart provided in 1978 by County Planning Department

example shows the wheat area as a proportion of total area sown to agricultural crops to have climbed from 20.2 percent to 43.2 percent, corn to have increased from 16.9 percent to 35.8 percent; and potatoes to have gone from 12.2 percent to 14.3 percent while soybeans, gaoliang, and millet went from 10.3, 12.9, and 16.5 percent respectively to 1.5, 1.4, and 3.2 percent. Thus, the proportion of crops consuming water and fertilizer increased, and crops that nurture the soil decreased. The land was allowed no rest, and use and nurture were out of balance, impairing guaranteed harvest of high yields. For the most part, cotton was grown over too dispersed an area. For most communes the growing area was less than 20,000 mu, and thus full use could not be made of favorable conditions for intensification of centralized management to increase cotton output.

3. Land production levels not high; numerous low yield fields, but great potential for increased yields

Despite the fairly good soil resources conditions in this region, levels of production remain low. In 1978, yields from grain cultivation were only 433.2 jin per mu, 18.7 percent lower than average yields per mu from grain cultivation in Shandong Province. Cotton yields were only 30.1 jin per mu, which was also lower than average yields for the province overall. Survey shows that fields in the region producing consistently high yields amounted to 28.4 percent of total cultivated land, while fields with moderate or fairly low yields accounted for 71.6 percent of total cultivated land. For a long time, the reasons for the low and inconsistent yields have been the four unfavorable elements of drought, waterlogging, alkalinity, and infertility. Development of water conservation endeavors since Liberation, which has greatly increased the irrigated area, has generally reduced the threat of drought. In the case of waterlogging, thanks to dredging of rivers and the digging of ditches, and major efforts on the draining of water, a remarkable increase has also occurred in water drainage capabilities. Alkalinity comes and goes as water comes and goes, and since the problem of drought and waterlogging have not been fundamentally solved, the problem of alkalinity remains. Furthermore, because irrigation is not done in a sensible way in some places,the trend toward increase in alkaline soil continues. However, in terms of increasing agricultural output, the inadequacy of fertilizer and the infertility of the soil makes for a universal problem. Results of a soil survey show that currently the organic content of most soil is from 0.6 to 0.9 percent, total nitrogen is 0.04-0.06 percent; rapid acting phosphate is 15-18 milligrams per kilogram; and quick acting potash is 117-130 milligrams per kilogram. This shows that except for potash, for which there is no shortage, other chemicals are inadequate. If the problem of nurturing the soil can be satisfactorily solved, agricultural output can increase remarkably, while at the same time helping improving the alkaline-saline soil.

4. Differences in soil use from area to area rather striking

The differences in land forms, soil, underground water and such natural conditions, and the extent of damage from drought, waterlogging, and alkalinity on the Northwestern Shandong Plain show up in the characteristics of agricultural, forest, and cattle raising output, and are strikingly different from distribution in other areas. On the basis of natural conditions, the structure of the agricultural sector, the crop structure, and output levels, the region may be divided into the following five types of agricultural soil in terms of use (Figure 3).

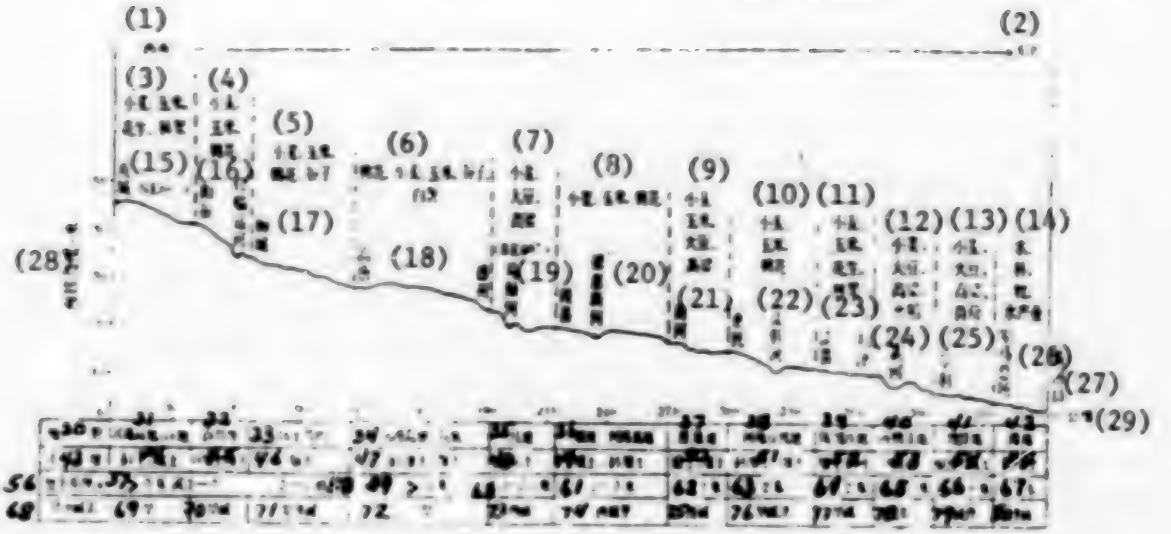

Figure 3. Cross Sectional Drawing Showing Types of Land Use on Northwestern Plain

Key:

(1) Southwest
(2) Northeast
(3) Wheat, corn, peanuts, woods
(4) Wheat, corn, cotton
(5) Wheat, corn, cotton, millet
(6) Cotton, wheat, corn, millet sweet potatoes
(7) Wheat, soybeans, gaoliang
(8) Wheat, corn, cotton
(9) Wheat, corn, soybeans, gaoliang
(10) Wheat, corn, cotton
(11) Wheat, corn, peanuts, woods
(12) Wheat, soybeans, gaoliang, rice
(13) Wheat, soybeans, gaoliang, alfalfa
(14) Farming, forestry, livestock raising, and aquatic products industry
(15) Guancheng (NE 60°)
(16) Yanggu, Weilin Canal
(17) Liaocheng
(18) Gaotang, Dezhou
(19) Majia River
(20) Ling County, Dehuixin River
(21) Shang River
(22) Huimin, Tuhai River
(23) Bin County, Lijin
(24) Yellow River
(25) Kenli
(26) Main military horse farm
(27) Mouth of Yellow River
(28) Elevation above sea level (meters)
(29) Kilometers
(30) Landforms
(31) River shore, high ground, sandy soil
(32) High slopes
(33) Gentle slopes
(34) Elevated land along rivers and hills
(35) Low-lying land
(36) Slopes and elevated land along rivers
(37) Low-lying slopes
(38) River shore and high slopes
(39) Gentle slope sandy soil
(40) Low-lying river troughs
(41) Low-lying slopes
(42) River shore
(43) Soil
(44) Sandy soil, loam
(45) Sandy loam, loam
(46) Loam
(47) Sandy loam, loam
(48) Clay
(49) Loam, Sandy loam
(50) Clay loam
(51) Sandy loam, loam
(52) Loam, sandy soil
(53) Clay
(54) Clay, alkaline soil
(55) Sandy loam

[key continued]

[continuation of key to Figure 3]

(56) Depth to underground water
(57) 3 meters or 2-3 meters
(58) 2-3 meters
(59) 3 meters
(60) 1.5-2.0 meters
(61) 2-3 meters
(62) <2 meters
(63) 2 meters
(64) 1-2 meters
(65) 1.0-1.5 meters
(66) 0.5-1.0 meters
(67) 0.5 meters
(68) Drought, waterlogging, or alkalinity damage
(69) Drought
(70) Drought and alkalinity
(71) Drought, waterlogging and alkalinity
(72) Drought
(73) Waterlogging and alkalinity
(74) Waterlogging, alkalinity and drought
(75) Waterlogging and alkalinity
(76) Drought, alkalinity and waterlogging
(77) Drought
(78) Waterlogging
(79) Alkalinity and waterlogging
(80) Waterlogging and alkalinity

(1) The area of cultivated land devoted to highland grain and cotton producing high yields amounts to 20.2 percent of the cultivated land in the entire region, most of it distributed to the west of the Majia River and to the region south of the Xiaoqing River. Here the terrain is fairly high, water drainage good, underground water sweet, conditions for irrigating from wells good, and soil fertility fairly high. Mostly cotton and grain crops are grown, cotton fields occupying more than 20 percent of the cultivated land, or as much as more than 30 percent in some places. Grainfields occupy about 50 to 60 percent of the land. Grain and cotton yields are 400-600 jin and 30-40 jin per mu respectively, putting them in the high yield category. Drought, waterlogging, salinity-alkalinity, and soil infertility are the major problems here in agricultural production.

(2) Moderate yield grain and cotton grown on sloping land accounts for 50.6 percent of the total of cultivated land in the region, most of it being distributed on both banks of the Yellow River and in the basin of the Tuhai River. Where the terrain is gently sloping, water drainage is somewhat difficult; underground water consists of both sweet and brackish; and a combination of irrigation using wells and ditches is used. Organic content of the soil is slow, and fertility is not high. It is suited mostly to the growing of grain crops, and cotton secondarily. Grainfields occupy between 60 and 70 percent of cultivated land. Cottonfields account for less than 20 percent. Grain and cotton yields are 300 to 500 jin and 20-30 jin per mu respectively, putting them in the moderate category. Drought, waterlogging, alkalinity-salinity, and soil infertility are the principal problems in agricultural production here.

Low grain yield low-lying land accounts for 21.4 percent of total cultivated land area. This type soil is widespread, the area between the Majia River and the Tuhai River and in seacoastal areas being fairly large. Drainage of water from low-lying terrain is difficult. Underground water lies just below the surface, and the area of waterlogged depressions and alkaline soil is large and

most devoted to the growing of wheat, soybeans, and gaoliang. Along both banks of the Yellow River, some low-lying areas also grow paddy rice, most of it being done in combination with a change of the soil's alkalinity. Here there is a large amount of land relative to population; farming is done in a crude way; damage from waterlogging and alkalinity is severe and output low, with grain yields being only somewhat more than 200 jin and no more than 300 jin per mu, being in the category of low farm yields.

(4) River flats sandy soil in which oil crops, grain, and forests grow account for 5.5 percent of the total cultivated land, and is mostly distributed in Guan County, and in Linyi and Lijin Counties in the old bed of the Yellow River. The area of sandy soil is large, its fertility poor, and wind erosion severe. Some places have shifting sands, which hurt nearby farmlands. Mostly grown is peanuts, potatoes, timber forests, and economic forests.

(5) Coastal beach livestock raising, forestry, and fisheries account for 2.3 percent of the total cultivated land area. Wastelands abound here, and the potential for development is great. A state agriculture, forestry, and livestock raising farm has been built here for the development of farming, forestry, and animal husbandry. Saltworks have been built along the coast, and both saltwater and freshwater shrimp are being raised.

III. Several Problems in Further Rational Use of Land Resources

In view of the natural characteristics of this region, full rational use of land resources entails principally the following several problems.

1. Problems in Adjusting General Methods to Local Situations for Planting.

Very great changes have taken place in the crops patterns of the northwestern region of Shandong since Liberation. These have been manifested in an increase in the grain crop area, a decrease in the economic crop area, an increase in high yield crop areas, and a decrease in the area of crops tolerant of waterlogging. This plus failure to take into full consideration the conditions characteristic of each locale, and emphasis on "arbitrary uniformity" have made for a crop pattern that is not only irrational, but one that has impaired crop outputs and numerous needs of the peoples' livelihood. Considering this region's characteristic conditions of "spring drought, summer waterlogging, and further drought in late autumn," as well as the "rather severe drought, waterlogging, and alkalinity," henceforth local areas should curtail their wheat and corn growing areas, and enlarge the growing of soybeans, gaoliang, and millet. In places where conditions permit, more cotton and peanuts should be planted in a readjustment of crop growing ratios. Though wheat would avoid the waterlogging period and is a crop that produces consistent yields, its growing area should not be too large so as to avoid creation of a problem in trying to do the three summer jobs of planting, harvesting, and field management all at the same time, squeezing out spring-sown crops. Corn is a high yield crop sown in summer, but since it cannot withstand either drought or waterlogging, while soybeans can both tolerate waterlogging and

help nurture soil fertility, as well as being a crop the masses like to grow, soybeans should be restored to their appropriate position as a summer-sown crop, and their planting expanded. The tolerance of gaoliang to waterlogging is even greater, and gaoliang can supply some of the need for construction materials and fuel. Their planting in low-lying areas should be appropriately expanded to insure harvest of consistent yields. Millet can both be used to vary grain varieties and to provide high quality feed for livestock. It should be revived and developed.

This region is an important integral part of the Yellow River basin cotton growing area, and it is the major base in Shandong Province for cotton production. However, the following several problems require solution: 1) Consistent cottonfield acreage should be put into a proper relationship between grain and cotton so that grain does not exert pressure on cotton production, and to assure the cotton growing area. Second is a reduction in the ratio of cottonfields on saline-alkaline, low-lying, waterlogged, and infertile land. 2) Readjustment of cottonfield patterns so as to better strengthen leadership, to use advanced techniques for growing cotton, to promote consistently high yields of cotton, to increase the cotton commodity rate, and to bring into being the mechanization of cotton growing. Suitable readjustment in current cottonfields and concentration of growing areas should be done for these purposes. Right now there are 14.82 million mu of scattered cottonfields, spread over 343 communes. Management of these cottonfields is crude; yields per unit of area are very low; much cotton is held back by growers; and the commodity rate is low. These fields should be readjusted and concentrated in communes and brigades where conditions of production are fairly suitable. The overall trend in such a readjustment should be concentration on high land of cotton areas now located on low-lying land; concentration in high yield areas rather than in low yield cotton growing areas, the extent of concentration being controlled by communes at 30 to 40 percent of the total cultivated area. In planting, sizes of plots should be regulated, continuous tracts being set aside for the purpose so as to vigorously increase cotton yields per unit of area. This would favor full use of nature, centralize administration and management, promote modern scientific and technical methods, and increase cotton output.

2. Issues in Land Use and Land Nurture

The extent of land nurture in this region is fairly low, most soil being of low fertility. A survey done in Liaocheng Prefecture shows organic content of the soil to be 0.7-0.9 percent, the average quick acting phosphate to be less than 10 milligrams per kilogram, which is lower than the normal phosphate content of the soil (usually 20 milligrams per kilogram). In order to build up soil fertility, in addition to increasing applications of fertilizer, one important way is development of green manure crops, making the growing of green manure a part of planting plans and a system of crop rotation, and advocating multiple cropping, intercropping, and interplanting of green manure and grain. Green manures suited to growing in this region include sesbania, alfalfa, and Chinese trumpet creeper. One planting method is, following harvest of wheat, to plant green manure, suitable to low-lying waterlogged areas where the amount of land is great relative to population and where fertilizer is insufficient. Another way is, before harvesting is done, to interplant corn with wheat before the wheat has been harvested

and then to plant green manure after the wheat has been harvested. This is suited to places lacking in fertility. During the first year, wheat and sesbania may be intercropped, and after the sesbania has been plowed under the second year, corn may be interplanted. Following the wheat harvest, green manure may be planted. This method is suited to places in which water and fertility conditions are fairly good. In cotton growing areas, cotton and green manure can be intercropped or rotationally planted. Though intercropping with green manure takes up land area, through a combination of broad and narrow rows, and a mixture of tall and short crops, which permit circulation of air and penetration of light, light and heat conditions will be good. Nodule bacteria on the roots of green manure crops can fix nitrogen and increase soil nutrients. When green manure is turned under, the organic content of the soil is also increased. A survey done in the Eyapo Brigade in Yanggu County showed anoverall nitrogen increase of 43 percent in soil where green manure was planted (for 1-2 years) and turned under as compared with soil where no green manure was planted. Total phosphate increased by 15.9 percent; quick acting potash increased by 81.6 percent; and organic matter increased by 33.2 percent. An increase in wheat yields averaging 125.4 jin per mu were harvested for a yield increase of 68 percent.

The rotational cropping system should be reformed and a system that combines soil use with soil nurture instituted. In view of the problems in this area whereby the pattern of crops shows growing of grain alone and too great a multiple cropped area, henceforth the system of two crops a year should be scaled down, and the system of three crops every 2 years should be increased so as to restore and increase soil fertility, moderate the pressures on the workforce, and obtain consistently high yields. As a practical matter, in places where population is large relative to land, and in places where farming levels are fairly high, the area of two crops a year may be a little larger. However, in places where land is abundant relative to population, and where water and fertility conditions are somewhat poor, the area of two crops a year should be retrenched, and the area of three crops every 2 years expanded so as to nurture the soil and to rotate land allowed to lie fallow during the winter season. In the various counties along the seacoast, there should be a reduction in the system of two crops each year, and an increase in three crops every 2 years, expansion in the rotational cropping of grain and beans and grain and green manure, while at the same time some of the saline-alkaline land may be used to grow pasture grass, green manure, and gaoliang to establish a fodder base for the development of the cattle, sheep, and rabbit livestock industry in a combination of farming and animal husbandry.

3. The Problem of Reforming the Low-Lying Alkaline Lands

There are 6.5 million mu of low-lying, waterlogged and saline land in this region, totaling 27.7 percent-of the cultivated land. It is distributed along rivers, in tracts of flat land, and throughout the coastal area. Most of the low-lying land is waterlogged, and if it is not waterlogged, it is alkaline. Waterlogging and waterlogging go along with each other, and this is the region where waterlogging is most severe. Analysis of statistical data for 21 of the 26 years from 1949-1975 shows waterlogging to have been fairly serious in 10 of

those years of almost half of them. The waterlogged area was generally about 6.5 million mu, or as much as almost 10 million mu. In many years the waterlogged area averaged one-third the total cultivated area, and grain yields fell by more than 30 percent. Therefore, vigorous improvement in low-lying, waterlogged, alkaline lands is a major way to change the backward condition of agriculture on the Northwestern Shandong Plain. Looked at in terms of land utilization, ways to improve and use low-lying, waterlogged, alkaline land are as follows: 1) A large amount of water conservancy construction, improvement in the drainage system, and intensification of the equipping of the system of ditches in separate systems for irrigation and drainage. Digging out of rivers to clear them of silt, and dredging of watercourses to increase drainage capacity. Spread of flatland cultivation in cofferdams, and storing of sweet water to suppress alkalinity, used in conjunction with drainage of water through shallow ditches and drainage of water from terraced fields. 2) Planting of crops that tolerate waterlogging and alkalinity and spread of green manure to remove alkalinity. A survey done in Jiazhuang Brigade, Gucheng Commune, Shen County shows that the salt content of alkaline soil planted to green manure for 2 years was 0.18 percent less than for soil not planted to green manure. Soil planted to green manure for many years had 0.2 percent less salt content than soil not planted to green manure. In low-lying alkaline fields where water resources are fairly good, a certain amount of paddy rice may be grown to wash away and suppress alkalinity-salinity. Experiments have shown that the growing of rice for a single season can purge the soil of from 40 to 90 percent of its salinity. But where not much rice can be grown, drainage has to be done. 3) Planting of trees to create forests. Afforestation can lower the underground water table and reduce surface evaporation. Some low-lying, waterlogged, alkaline areas can plant false indigo, poplars and willows, and locust trees, which tolerate waterlogging and alkalinity. 4) Diversion of silt from the Yellow River to effect improvements. Huimin Prefecture has achieved success in the diversion of the Yellow River to drop silt to improve low-lying, alkaline soil. At Xiaoying Commune in Boxing County, on both shores of the Yellow River over an area of 150,000 mu of low-lying alkaline line, silt has been deposited to improve the soil, and a switch made to the planting of rice for yields of more than 500 jin per mu.

4. The Problem of Developing Wastelands for Use

This region has a total of 6,336,600 mu of wasteland, amounting to 11.16 percent of the total area (of which sandy wastes account for 0.32 percent, alkaline wasteland accounts for 2.16 percent, coastal wasteland accounts for 7.45 percent, and coastal beaches account for 1.23 percent). More than 90 percent of the wasteland is concentrated in Huimin Prefecture, distributed mostly at Caizhouwan, Yongfeng He, Dao He, Shenxian Gou, Wu He, Tao He, Nanbeiwang, Xinhu, Taoer He, Tanyang, Chengkou, and Chaojian, which are 12 reclamation areas in the region. Approximately 3 million mu[1] of wasteland can be reclaimed, 15.7 percent of which is suitable for farming, 34.5 percent of which is suitable for forestlands, and 49.8 percent of which is suitable as pastureland. In terms of quality and condition for development of use, the wastelands may be divided into three general categories as follows. One is the new silt lands of about

1. Data derived from Huimin Prefecture Agriculture and Land Reclamation Bureau, Shandong Province, 1979.

1.2 million mu where the silt was accumulated fairly late in time, its quality is quite good, and the soil layer is quite thick (1.4-1.6 meters). It is only slightly saline-alkaline; grass cover is fairly good; and it can be reclaimed for agricultural use. Second is the mildly alkaline land, of which there is about 600,000 mu distributed rather generally. Soil quality of this land is poor; grass cover is scant, and alkaline-tolerant crops such as alfalfa, sesbania, safflowers, false indigo, and sunflowers, as well as woods may be planted to protect the grassland and vigorously develop a livestock industry to establish livestock industry production bases. Third is sandy soil covering 300,000 mu, mostly useable for afforestation with locusts, willows and poplars. The remaining seriously alkaline soil amounts to about 900,000 mu, and can be developed mostly with reeds, and chaste trees to provide raw materials for plaiting. In order to sensibly develop use of wasteland resources along the seacoast, a further survey of wastelands should be organized to determine the quantity of wasteland, the quality and conditions for developing its usefulness. There should be unified planning, adaptation of general methods to local situations, and incremental development of this land for use. Development should be by a combination of state ownership and collective in which state ownership predominates, and a combination of animal husbandry, forestry, and farming in which animal husbandry predominates, with much rotational cropping of grasslands. Beaches along the seacoast can develop mostly a salt industry and aquatic product hatching industries. In addition, some inland sandy wastelands and alkaline wastelands can develop mostly forestry and the livestock industry, in a combination of forestry, livestock raising and farming.

5. Problems in Development of Irrigated Land and the Northward Transfer of Water From the South

In order to triumph over damage caused by drought, waterlogging, and alkalinity, ever since Liberation the party and government have undertaken large water conservancy construction, which has steadily increased the irrigated area. In 1949, the irrigated area in this region amounted to 3 percent of the total cultivated area; in 1965, it was 15 percent; in 1970, it was 30 percent; and by 1978 irrigated land amounted to 18,643,800 mu, or 62.48 percent of the total cultivated land area. The extent of increase in water conservancy increased remarkably, so that the average amount of irrigated land per capita is 1.36 mu. Henceforth, with the building of farmlands with consistently high yields, a shortage of water resources will continue to impair further development of agriculture. Survey shows that we consider the major ways to solve the water shortage over the near term to be: 1) Accelerated fitting out of water conservancy projects to the most in irrigation benefits from existing water conservancy facilities, to improve irrigation techniques, and to increase the water utilization rate. Use of various measures to increase the water utilization rate from the present 30 to 40 percent to 40 to 50 percent, thereby expanding the irrigated area by 5 million mu. 2) Sensible management of water resources within the region. Areas near the Yellow River should vigorously develop use of underground water, and develop well irrigation so that water from the Yellow River can be used in areas lacking water. Liaocheng Prefecture's proposal for transfer of water from the west eastward, and Dezhou Prefecture's proposal for the transfer northward of water from the south (the waters of the Yellow River) are all imaginative plans for rational use of existing water resources within the region.

3) Adaptation of general methods to local situations for using brooks and ponds in the storage of water to expand back-up sources, and increase underground water, using water from seasons with much water for seasons with little water to solve the problem of a lack of water in "funnel areas." 4) Study and summarization of experiences in the scientific use of water, experiments in adapting general methods to local situations and spreading new irrigation techniques.

The northward diversion of waters from the south is a major and huge water conservancy project in China that not only ramifies into the use of water for agriculture and the development of production on the Huang-Huai-Hai Plain, but also raises questions of changes in the natural environment of the great plain. Since this is a matter affecting the total picture, it must be carefully considered, consideration being given on the basis of existing water resources and the state of their use, to lessons learned from diversion of the Yellow River, and the economic impact. We believe that in the short term it will not be possible to divert waters from the Yangtze River to the Northwestern Shandong Plain, the reasons being as follows: 1) Locally existing water resources have not been fully inventoried. Though water conservancy departments at various levels have an understanding of some existing water resources, the overall understanding is fairly unrefined. Full scientific understanding is still lacking of just how much water there is in the region, and how much water is lacking. 2) Water conservancy projects have yet to be fully equipped. Water and soil (no leveling of the land) are not a coherent whole, and the level of irrigation technology and management is low. Consequently, utilization of water resources is incomplete and irrational. Were various measures adopted to increase the water utilization rate, the potential would be fairly great. 3) In this region, the closeness to the surface of the underground water table causes serious damage through waterlogging and alkalinization. Survey shows that with the revival in 1970 of diversion of the Yellow River for irrigation, a startling tendency toward increase in the amount of saline-alkaline soil has occurred in some places. Should the Yangtze River also be used to provide irrigation, given the current levels of irrigation technology and management, the occurrence of secondary salinization of the soil would be unavoidable. 4) Once southern waters are diverted northward, the ordinary level of the Beijing-Hangzhou Canal will be higher than the water level in other watercourses. This would cut off the outlet for drainage of water in the broad basin to the west of the canal, seriously impairing both drainage of waterlogging and drainage through seepage. Investment would be great and costs high. 5) It is estimated that the raising of the waters of the Yangtze by several levels to the area north of the Yellow River would cost an average 0.025 yuan per cubic meter, and to get it to the fields would cost an average of 0.04 yuan per cubic meter. The country can neither afford such huge capital construction investment over a long period of time, nor can communes, as consumers of the water, afford such huge expenditures for water. On the basis of the foregoing superficial analysis, we feel that solution to the problem of water conservancy construction for the Northwestern Shandong Plain lies, in the near term, not in the movement of the waters of the Yangtze, but rather in solution to the problem of how best to make full use of water resources already existing in the region. Existing financial, material,

and human resources should be put to work in equipping water conservancy projects, and in strengthening management-to increase, to the maximum extent possible, the utilization rate of existing water resources. As for long-range plans to divert southern waters northward, because of the impact on various aspects of the natural environment and the economy, it is recommended that those concerned continue thoroughgoing study to come up with a scientific plan.

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## REGULAR FARMING OF PRIVATE PLOTS BY SAME INDIVIDUALS ENCOURAGED

Taiyuan SHANXI RIBAO in Chinese 23 Sep 81 p 2

[Article by Wang Anguo [3769 1344 0948], "Private Plots Should Not be Changed Willy-Nilly"]

[Text] Central Committee policies on private plots have been well received by the peasants are still somewhat apprehensive. They fear that production teams may, at any time, switch around private plots, and they wish that private plots were as firm as systems of responsibllity. We should act according to the will of the people.

There are historic reasons for peasant fears that private plots are not firm. During the "Great Cultural Revolution," private plots would be taken away this year only to be given back next year, given back and taken away, taken away and given back. In some places during periods when private plots were given to commune members to farm, the plots were changed twice every 3 years. After the peasants improved the fertility of their private plots with great effort, the plots were changed again. Reasons for willy-nilly changing of private plots are three: One is that some production teams desire to use commune member enthusiasm for farming private plots to reform the "three categories of fields." Another is that a population changes, private plots change along with it. Third is with every change in cadres goes a change in private plots.

"Think things over; don't knock things over." When private plots are firm, commune members can devote themselves to building up the soil, to orchestrating private plot output, planting mulberry and raising silkworms, or growing perennial crops or pharmaceutical materials. Still other commune members make plans to improve the soil to increase its fertility so that they can increase their income from private plots.

In order to make private plots firm, it is necessary, first of all, to continue to eliminate leftist influence. Second, it is necessary to democratically formulate some needed systems and not let a small number of cadres say what will be done.

9432
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SHANXI IMPROVES COMPETITIVENESS OF SMALL PLANT NITROGENOUS FERTILIZER

Markets Open

Taiyuan SHANXI RIBAO in Chinese 30 Sep 81 p 1

[Article by Geng Tian [5087 3944] and Tai Xian [1132 6513]: "Markets Opened For Sales of Nitrogenous Fertilizer From Small Plants in Shanxi Province; Quality Up, Costs Down, Contracts Fulfilled, and Promises Kept"]

[Text] Markets have been found for nitrogenous fertilizer produced in small plants in Shanxi Province. Problems in large overstocking of output have begun to be solved. Statistics from departments concerned show that as of the end of August the province's sales of ammonium carbonate totaled more than 1,129,000 tons, and the quantity of ammonium carbonate in storage had declined to somewhat more than 160,000 tons. As a result, the Provincial People's Government called upon small nitrogenous fertilizer enterprises to operate at full capacity and strive to increase output to make a greater contribution.

During the past 2 years a situation of overstocking of nitrogenous fertilizer produced by small plants has occurred in Shanxi Province. According to year end statistics last year, the amount of ammonium carbonate in storage throughout the province totaled more than 600,000 tons, and because sales were dull and funds did not circulate, some enterprises stopped or restricted production. In order to change this situation, this year provincial chemical fertilizer companies and small enterprises producing nitrogenous fertilizer promoted various forms of a system of economic responsibility, improved administration and management, raised quality, lowered waste and costs, and made efforts to increase product competitiveness. In addition they made product sales the determinant of whether an enterprise should continue to exist and develop. They also improved quality of packaging on the basis of users' views, honored contracts in making sales, kept their word, adopted fairly flexible methods in marketing methods and pricing, and gained the confidence of customers for steady expansion of their markets. As of the end of August, the province had signed contracts with customers outside the province for the supply of 1 million tons of goods. Ammonium carbonate sales to Guangxi, Shandong, Sichuan, Anhui, and Henan have reached more than 700,000 tons. Sales of chemical fertilizer within the province have also recorded achievements, amounting to more than 420,000 tons between January and August.

## 'SHANXI RIBAO' Commentary

Taiyuan SHANXI RIBAO in Chinese 30 Sep 81 p 1

[Article: "Strive To Increase Small Plant Output of Nitrogenous Fertilizer"]

[Text] Accompanying establishment of systems of responsibility for rural production is an increase in peasant enthusiasm for use of chemical fertilizer, and the quantity required has steadily increased. In national terms, the shortage of fertilizer continues to be very great, and the state must every year import chemical fertilizer from abroad. Development of large and medium size chemical fertilizer plants faces numerous limiting conditions and quite a few difficulties; therefore, for some time in the future small chemical fertilizer plant production will continue to enjoy bright prospects. We must have a very clear understanding on this point.

Shanxi Province is a land of coal where development of small plant chemical fertilizer production enjoys exceptional advantages. Small plant chemical fertilizer production is in the category of a coal processing industry, and vigorous expansion of small plant chemical fertilizer production possesses major significance for the utilization of local resources, making the most af advantages, enlivening the province's economy, rendering assistance to agricultural production, and increasing government revenues. It also plays a positive role in reducing transportation of coal outside the province, in reducing pressures on railroad transportation, and in helping agricultural production in other provinces. Now that markets have been found for small plant nitrogenous fertilizer, CCP committees at all levels must continue to take in hand small plant chemical fertilizer production. Except for a small number of small nitrogenous fertilizer enterprises that have long since halted production, and where the production situation is not good, which positively cannot start up again, measures must be actively taken to operate at full capacity now in an effort to increase output to make a greater contribution to the support of agriculture.

9432
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## INSTRUCTIONS GIVEN FOR PLANTING WINTER WHEAT THROUGHOUT SHANXI

Taiyuan SHANXI RIBAO in Chinese 23 Sep 81 p 2

[Article by Li Huanzhang [2621 3562 4545]: "Summarize This Year's Experiences For Good Planting of Next Year's Wheat"]

[Text] Shanxi Province has harvested a bumper wheat crop despite this year's continuing drought conditi ns. Apart from the strength that policies provide, we must summarize experiences in scientific farming for the good planting of next year's wheat.

The grains of wheat produced this year were plump, their weight per thousand between 3 and 5 grams higher than in ordinary years. An old farmer's saying has it that "When the wheat grows without a hitch, half again as much will be harvested." This shows that when weather conditions were right this summer during the wheat's in-the-milk stage, the foundation for plant growth and development was rather good. The unfavorable weather that for many years hurt the per thousand weight of wheat grains resulted primarily from dry, hot winds during the in-the-milk stage. This year the main reason why the wheat was not damaged by hot, dry winds was that it matured about 10 days earlier than usual. This was because temperatures during the previous winter were fairly high, resulting in the formation of strong seedlings. This, plus the early greening up of the wheat in the spring, created conditions for the later maturing ahead of time. This tells us just how important it is that sturdy seedlings be grown during the previous winter to promote early development and early maturation of the wheat.

By the so-called continuing drought is meant the especially small amount of rainfall during the wheat growing season. Rainfall during the 1980-1981 wheat growing season was the smallest amount since the 1960's; however during the times when the wheat's need for water was critical just before sowing, during tillering in the previous winter, and during jointing in spring of the following year, good rain fell in the proper amount and proper concentrations. In Shanxi Province, where water resources are lacking, this has encouraged us to enlarge the irrigated area for critical times to increase the effectiveness of water.

For sturdy seedlings, it is necessary, first of all, to pay attention to planting on time. In Jinzhong Prefecture, when bailu [around 8 September] comes early and hanlu [around 8 October] comes late, the period of the autumn equinox is the right one in which to plant wheat. In Linfen Prefecture, during chushu [around 23 August]

is the right time in the high mountains; bailu [around 8 September] is the right time for planting on the lowlands, during qiufen [the autumn equinox around 23 September] is the right time in one's dooryard, and the period of hanlu [around 8 October] is planting time along rivers. In Yuncheng Prefecture wheat should be planted no earlier than qiufen [the autumn equinox] and no later than hanlu [around 8 October]. In the far south around Fenglingdu, wheat should be planted at bailu [around 8 September] in the high mountains, and at hanlu [around 8 October] on the flatlands. Though the time for sowing differs north and south, one point in common is that from the time of sowing until winter freezing occurs, accumulated temperatures above 3 degrees centigrade of between 560 and 580 degrees are required. On-time planting requires no investment yet it can effectively increase yields.

In order to take advantage of the season and assure sowing on time, the machine-planted area should be enlarged as much as possible, and large, plump seed grain should be used. It is also necessary to select the superior varieties to each area, heavily apply base fertilizer, saturate the ground, where conditions permit, with basic moisture, use the proper quantity of seeds, and plant the seeds in properly spaced rows and patterns, doing strictly what is required for each link to win an even greater bumper harvest next year.

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CSO: 4007/60

## WHEAT FARMING TECHNIQUES DEMONSTRATED

Taiyuan SHANXI RIBAO in Chinese 21 Sep 81 p 2

[Article by Guo Bo [6753 3134]: "Linyi County Trains Mainstay Cadres in Wheat Farming Techniques"]

[Text] The Linyi County People's Government has recently trained a group of mainstay cadres in wheat farming techniques, promoting techniques for increasing wheat output.

In Linyi County, 850,000 mu of wheat is grown. This amounts to half the farming area in the county, which is the largest wheat growing county in the province. By way of spreading new techniques in wheat growing, County CCP Committee leaders personally acted to invite Qiao Ruiqing [0829 3843 3237] and Fan Zhijie [5400 1807 2638], agronomists from the Provincial Wheat Institute and the Provincial Cotton Institute to lecture on the "Wheat Production Dmmonstration Program" and on research on the three laws of wheat production. County Science Committee scientists and technicians gave careful coaching. In order that this job might be done well, before the end of August each commune's technicians briefed production brigade and team cadres throughout the commune on the "demonstration program" and proposed technical measures suited to local conditions for application to production team and household plots. Commune technicians contracted work on separate tracts, and production brigade technicians signed technical contracts for increased yields with teams and households. In addition, they planted model fields and control fields.

9432
CSO: 4007/60

## RAISING OF LARGE LIVESTOCK ANIMALS ENCOURAGED IN LINFEN PREFECTURE

Taiyuan SHANXI RIBAO in Chinese 23 Sep 81 p 1

[Article: "Rapid Expansion of Large Livestock in Linfen Prefecture. Policies Liberalized, Measures Beneficial, Public and Private Sectors Develop Together. During Past Year Privately Raised Livestock Have Increased by More than 40,000 Head While Collectively Raised Livestock Have Increased by 8,000 Head"]

[Text] The number of large livestock raised by commune members in Linfen Prefecture this year has vastly increased. Statistics as of the end of August show a total of 51,280 head, a more than fourfold increase over the same period last year.

In the process of readjusting the internal structure of agriculture last year, the various counties and municipalities of Linfen Prefecture decided to reverse the many year trend toward decline in the livestock industry and to hasten the speed of development of the livestock industry. To this end, all echelons of CCP committees further emancipated mentality, and liberalized policies. While developing collective large livestock, they gave active support to the raising of livestock by individual commune members. The counties and municipalities used public announcements and documents to spell out the varieties and limitations on numbers of large livestock that commune members could raise, brooking no interference from anyone. Commune members who provided manure to production teams from their raising of livestock were to be paid fair compensation. Each county and municipality actively developed specialized households and specialized persons for the raising of livestock, and now there are more than 50 specialized households in the prefecture engaged in the raising of large livestock.

in order to solve commune member difficulties in getting the funds to purchase large livestock, the prefecture made available to commune members loans totaling 11.9 million yuan for the purchase of large livestock. Each of the counties and municipalities in Pingchuan alloted a certain amount of livestock feed or grain for the feeding of livestock for households raising large livestock. For each head of large livestock raised by commune members in mountain regions, between one and 5 mu of hillside slope was allocated for grazing. All veterinary medicine stations and breeding stations also took the initiative in going into the countryside to provide veterinary and breeding services. Quite a few breeding stations also signed contracts with commune members to provide breeding services.

With the liberalization of policies and beneficial measures, commune member enthusiasm for the raising of large livestock reached an all-time high. During the same period last year, commune member raising of large livestock in the prefecture amounted to only 9,379 head, but now it has expanded to 51,280 head. The number of collectively raised large livestock has also increased by almost 8,000 head over the same period last year.

9432
CSO: 4007/60

## CHENGDU TAKES FLOOD PREVENTION MEASURES

HK051456 Chengdu Sichuan Provincial Service in Mandarin 2300 GMT 4 Nov 81

[Text] The agricultural, forestry, water conservancy, meteorological and other relevant scientific research units and the disaster-stricken areas in our province have officially formed scientific groups to sum up experiences concerning the unusually serious floods witnessed this year. The aim is to further ascertain and grasp natural laws and seize the initiative to transform and exploit nature. In order to do this job well, the provincial meteorological and agricultural bureaus have successively dispatched work groups composed of chief engineers and other scientific personnel to penetrate deep into the midst of disaster-stricken areas to make investigations. The Chengdu Geography Institute, the provincial hydrological station and the Pujiang hydrological substation and the relevant departments of Nanchong, Mianyang, Ziyang, Neijiang, Rongchang and other areas have separately written scientific research reports and through scientific work groups have summed up experiences and lessons related to floods. Data summed up by various areas show that the main cause of floods is heavy rainstorms. But there are also many factors attributable to man. For example, all irrational human economic activities, such as upsetting the ecological balance, causing soil erosion and blocking drainage systems, and so forth, have, to different degrees, added to the seriousness of a natural disaster.

According to investigations of seven communes of Ziyang County along the Tuo River, hosts of facts show that none of the areas that reclaimed land from rivers escaped the attack of the recent floods. It is suggested that we should now further solve the problem of understanding the great significance of afforesting both banks of the river--a problem involving cadres at all levels. We must quickly carry out the policy concerning afforested areas along rivers, cooperate in obtaining proper saplings and tree strains to improve the quality of forests, and set up tree nurseries, and so forth at fixed locations in a planned manner. Investigative data obtained by Ziyang County about the laws of floods affecting the actual geographical position also tell us that in our future town planning, we must take antiwaterlogging and anti-flood measures into consideration. In selecting sites for factories, villages, residential housing, and so forth, we should in principle be guided by a flood water level above that recorded over the past 50-plus years. Residential housing should be arranged in orderly rows to facilitate the ebb and flow of floodwaters. Town and city drainage systems must be kept in good repair to ensure drainage. After investigating the mud-rock flow and other natural disasters in Sichuan, the Chengdu Geography Institute has put forward future preventive measures.

CSO: 4007/81

## BRIEFS

BUMPER TEA HARVEST--Zhejiang again harvested a bumper crop of tea this year. An annual harvest of tea leaves surpassing 50,000 dan is being harvested with greater frequency in a greater number of counties. Tea leaves are one of the major products of Zhejiang. Since last winter and this spring, the leadership at every level in the tea producing areas conscientiously implemented the party's economic policy in the rural areas, set up and perfected various types of responsibility systems such as specialized lines of production under contract with remuneration according to output and mobilized the masses to adopt advanced technological methods in order to overcome the detrimental effects brought by every kind of calamitous weather so that a bumper harvest of tea was obtained. The total output of tea leaves for the province may exceed 1.6 million dan which would be a marked increase of 1,508,000 dan more than last year. Last year there were only seven counties that had a tea output that amounted to or exceeded 50,000 dan. This year the number has already reached eleven, among which are the four counties of Sheng, Shao, Zhuji and Lin'an which have already surpassed the annual output mark of 100,000 dan. This was written by Hu Ping [5170 0988] of the Zhejiang Province Agricultural Department. [Text] [Hangzhou ZHEJIANG RIBAO in Chinese 2 Oct 81 p 1]

CSO: 4007/86

AUTHOR: ZHANG Ju [1728 5281]
YU Weixue [0060 4850 1331]
ZHAO Guoxun [6392 0948 8113]

ORG: ZHANG, YU of Department of Biology, Harbin Teachers University; ZHAO of Bin County Research Institute of Agricultural Sciences, Heilongjiang Province

TITLE: "Stimulation of Growth and Augmentation of Yield of Soybean by $^{60}$Co Gamma Ray Irradiation of Seeds"

SOURCE: Shijiazhuang YUANZINENG NONGYE YINGYONG [APPLICATION OF ATOMIC ENERGY IN AGRICULTURE] in Chinese No 3, 17 Sep 81 pp 7-12

ABSTRACT: Results of experiments by 4 organizations at 8 points in 1978-80 proved that $^{60}$Co irradiation of seeds can stimulate the growth, increase the area of photosynthesis, promote the accumulation of dry substance, and raise the rice yield. Compared with the control, the yield increase is 3.57-17.20 percent. In 1980, comparative experiments in 25.63 mu with 2 kr produced an average yield increase of 10.07 percent, in 22.20 mu with 3 kr 3.33 percent. Hence, the paper concludes that application of $^{60}$Co to irradiate seeds of soybean can promote yield increase and the suitable dosage is about 2 kr.
This paper was received for publication on 26 Jan 81.

AUTHOR: XIA Yingwu [1115 5391 2976]
XU Jiekun [1776 2638 0981]
QIU Simi [6726 1835 1378]
ZHAO Xinmiao [6392 2450 5379]

ORG: XIA, XU of Zhejiang University of Agriculture; QIU, ZHAO of Zhuji County Institute of Agricultural Sciences, Zhejiang Province

TITLE: "Shuangke No 1, a New Rice Variety Produced by Using Early Maturing Mutant"

SOURCE: Shijiazhuang YUANZINENG NONGYE YINGYONG [APPLICATION OF ATOMIC ENERGY IN AGRICULTURE] in Chinese No 3, 17 Sep 81 pp 12-17

ABSTRACT: To date most of the mutant crop varieties are bred out directly from the mutant and a few of them are products of hybridization of the mutant with other breeds. In recent years, successful use of a mutant as the parent in hybridization projects has been frequently reported and the number of resultant varieties increases every year. Since 1972, the authors have used an early maturing mutant, 72-9 obtained from $IR_8$ to carry out extensive hybridization with local breeds and other mutants. In 1977, 2 new varieties are bred out. This paper reports one of the two: the Shuangke No 1. The theoretical basis of using that particular mutant, the process of selection and breeding Shuangke No 1, its extension, and its performance in 19 experimental sites are recounted.
This paper was received for publication on 26 Jan 81.

AUTHOR: LOU Hongzhang [2869 3163 4545]
ZHANG Heqin [1728 0735 3830]

ORG: Both Research Institute of Atomic Energy Utilization, Chinese Academy of Agricultural Sciences

TITLE: "Reproductive Capacity of Semi-Sterile Progeny of Corn Borer (Ostrinia furnacalis Gurnee) Irradiated by Gamma Rays"

SOURCE: Shijiazhuang YUANZINENG NONGYE YINGYONG [APPLICATION OF ATOMIC ENERGY IN AGRICULTURE] in Chinese No 3, 17 Sep 81 pp 18-25

ABSTRACT: The release of radiated semi-sterile corn borers is one of the means of prevention and control of this pest. Offsprings of these semi-sterile male and female pests after they mate normal ones in the field may still occur and the survival capability and reproductive potential of these larvae provide the necessary data for selecting the optimal radiation dosage for producing the semi-sterile pests and for estimating the effect and the change of the field population. Using corn borers gathered from the western suburb of Beijing, Chongming of Shanghai, etc. the authors irradiated them with $^{60}Co$ (10-40 kr) and allowed them to mate with normal borers. The eggs ($F_1$) were kept moist in culture dishs and hatched under 20-28°C. After emergence, the imagoes were back-crossed to determining the mating ability, the number of eggs produced, and the rate of emergence. If larvae were produced by $F_2$ eggs, they were continuously fed for qualitative and quantitative comparison with $F_1$. Results indicate that to be effective, doses below 20 kr should not be used.
This paper was received for publication on 30 Dec 80.

AUTHOR: HE Zhichang [0149 0037 1603]

ORG: Department of Biology, Wuhan University

TITLE: "Absorption and Distribution of $^{32}P$ in Early Maturing Hybrid Rice and Its Parental Lines"

SOURCE: Shijiazhuang YUANZINENG NONGYE YINGYONG [APPLICATION OF ATOMIC ENERGY IN AGRICULTURE] in Chinese No 3, 17 Sep 81 pp 31-34

ABSTRACT: This paper studies the $^{32}P$ absorption and distribution conditions of 2 early xian hybrids produced by using the Honglianhuasi-15 sterile line. By comparison, the hybrids are found to absorb and transport to spikes and leaves obviously more $^{32}P$ than the parent sterile line and the restorer line before the completion of the heading time; by the milk-ripe time and afterwards, they absorb and deliver less than their parents. Based upon results of this study, the author recommends that in hybrid rice production attention should be given to water and fertilizer management of the late stage to prevent early withering and to guarantee supply of phosphorus. This is very important if high yield is to be obtained from hybrid rice.
This paper was received for publication on 24 Oct 80.

AUTHOR: DONG Yide [5576 0110 1795]
SUO Binhua [4792 3453 5478]
MENG Xianju [1322 7098 1444]

ORG: All of Jianlin University of Agriculture

TITLE: "Using Radioimmunoassay for Detecting Bacterial Leaf Blight (Xanthomonas oryzae) of Rice"

SOURCE: Shijiazhuang YUANZINENG NONGYE YINGYONG [APPLICATION OF ATOMIC ENERGY IN AGRICULTURE] in Chinese No 3, 17 Sep 81 pp pp 47-51

ABSTRACT: Since the technique of radioimmunoassay was established by YALOW and BERSON in 1956, it has now been extensively used in biology and medicine. Its application in the diagnosis of infectious diseases in domestic animals has also been reported but its use in the study of plant diseases is still in a primary research stage. In 1979, the authors experimented with its application to detect rice leaf blight pathogens. Processes of labeling the microorganism, preparing the antibody serum, and the radioimmunoassay are described. Results of determination of the pathogens in rice seeds and rice plants are reported. The authors conclude that radioimmunoassay is a highly accurate and specific technique for examining bacterial or virus pathogen carrying seeds or plants. Some concrete problems, such as preparation of highly efficient antibody and high ratio antigen, the selection of solid phase material of good absorbency, etc. remain to be worked out with future experiments.
This paper was received for publication on 20 Nov 80.

AUTHOR: WU Jinshui [0702 6855 3055]
ZHANG Zengquan [1728 1073 0356]
JIN Yafang [6855 0068 2397]
XIA Qiming [1115 0366 2494]

ORG: All of Shanghai Municipal Academy of Agricultural Sciences

TITLE: "Studies on the Intake of Rice Plant Juice by Brown Planthopper (Nilaparavata lugens) Using $^{14}C$ and $^{32}P$ Labeled Rice Plants"

SOURCE: Shijiazhuang YUANZINENG NONGYE YINGYONG [APPLICATION OF ATOMIC ENERGY IN AGRICULTURE] in Chinese No 3, 17 Sep 81 pp 52-55, 58

ABSTRACT: This paper introduces the method of using $^{14}C$ and $^{32}P$ labeled rice plants to feed brown planthoppers of various states of growth to determine the intensity of radiation of the rice plant juice taken by the planthoppers during the different stages of growth of the pest and the different stages of growth of the rice plant. Preliminary results indicate that short-winged female imagoes eat more than other types or states of the pest and the quantity of plant juice eaten is the greatest during the spike-forming stage and the smallest during the seedling stage. More juice is eaten from xian rice than geng rice during the early stage of tillering. Comparison of xian and geng rice of other stages of growth and development is to be the subject of future experiments and the complex relationship between the feeding quantity and the external environment, such as temperature and humidity, is also to be clarified in the future.
This paper was received for publication on 19 Feb 81.
6248
CSO: 4009/92

AUTHOR: ZHAO Heju [6392 0678 0658]

ORG: Research Institute of Oil Plants, Chinese Academy of Agricultural Sciences

TITLE: "How to Transplant Rape"

SOURCE: Beijing NONGYE KEJI TONGXUN [AGRICULTURAL SCIENCE AND TECHNOLOGY NEWSLETTER] in Chinese No 9, 17 Sep 81 pp 13-14

ABSTRACT: The triple-crop system of rape-rice-rice is generally practiced in the rape-producing region of the Changjiang valley; therefore, rape seeds must be planted in early Oct while the late rice crop is not ripe and ready for harvest until late Oct or early Nov. Hence, a great contradiction exists with regard to timing, and if the technique of cultivating rape seedlings for transplant is adopted this contradiction can be effectively resolved. Moreover, in regions of the dual crop system of upland cotton and rape, the seedling transplant technique must also be adopted to guarantee high yield for both crops. With the transplant technique, rape may be seeded suitably early to compensate for insufficient growing time in the field. After transplanting, roots develop before new leaves and this fact requires that only large and strong rape seedlings are suitable for transplant. Based upon this and other special characteristics of transplanted rape plants, the paper describes in detail the special technique and procedure of growing rape seedlings and transplanting them.

AUTHOR: None

ORG: Administrative Office, Yulin District, Guangxi Province

TITLE: "Manage Joint Seed Company Well to Promote the Development of Hybrid Rice"

SOURCE: Beijing NONGYE KEJI TONGXUN [AGRICULTURAL SCIENCE AND TECHNOLOGY NEWSLETTER] in Chinese No 9, 17 Sep 81 pp 6-7

ABSTRACT: In order to carry on hybrid rice development, the key problem of propagation for seed preparation must first be overcome. Those who are in charge in Yulin District summarizes the seed preparation experience of Mapo Commune of Luchuan County for the purpose of finding a new and economical technique. After the Mapo Commune Seed Station was established in 1979, the brigades became dependent and no one was particularly interested in the problems of quality, yield, timely supply, or selling. Negotiations ensued and the Commune Joint Seed Company was created in Aug 80. Some farmer-specialists are employed to take care of production. The brigades sign contracts to order seeds and the company plans its production according to the orders and has its own accounting system to calculate profit or loss. With the company to run the business of seed preparation, the yield has increased 37 jin/mu to reach 105 jin/mu and the purity and quality of seeds are such that aside from supplying the needs of 20 thousand mu of hybrid rice in the commune, it also sells 40 thousand plus jin to units outside the commune. From the profit, beyond bonuses distributed to units and employees, the company has accumulated 480 thousand jin of grain and 50 thousand yuan of cash. The joint seed companies established by Bobai and Beiliu Communes following the example set by Mapo Commune also report similar successful operations.

6248
CSO: 4009/96

AUTHOR: None

ORG: Xiangyun County Bureau of Agriculture; Xiangyun County Center of Agricultural Sciences

TITLE: "Investigation Into Ways of Increasing the Yield of Upland Wheat and Its Results"

SOURCE: Kunming YUNNAN NONGYE KEJI [YUNNAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 5, 25 Sep 81 pp 8-10

ABSTRACT: The regular wheat acreage of Xiangyun County is about 120 thousand mu, and about half of it is upland wheat. Due to the fact that the total rainfall of the 6 months of Nov-Apr is only about 150 mm, the cultivation has been rough, and the breeds are poor in adversity resistance, the unit yield of wheat has stayed around 100 jin/mu for a long time. In the past 2 years experiments have been carried out in terms of breeds and cultivation technique. A project of systematic selective breeding launched in the middle 70's has bred out the 601 which is early maturing and drought resistant. In 1980, the 601 was extended in 1479 mu and produced an average yield of 388 jin/mu, 60 percent above the deteriorated local breed Longer. The 7034, a product of Zhaotong District Center of Agricultural Sciences was also introduced in 1980. In experimental stations it has demonstrated yield increases of 32.4 to 59.2 percent. Under the adverse condition of the county, the paper concludes that early and deep plowing, heavy fertilizer application, suitable increase of plant density, and mulching to reduce evaporation appear to be effective for increasing the yield of upland wheat.

AUTHOR: XIA Liqun [1115 4539 5028]

ORG: Yunnan Provincial Plant Protection and Inspection Station

TITLE: "Investigation Into the Comprehensive Technique of Prevention and Control of Wheat Stripe Rust in Yunnan Province"

SOURCE: Kunming YUNNAN NONGYE KEJI [YUNNAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 5, 25 Sep 81 pp 11-14, 7

ABSTRACT: Following 1979 and 80, the central and northern wheat producing regions of the province again suffered heavy losses from stripe rust. The Provincial Department of Agriculture ordered the station to call a wheat rust symposium in Jun to analyze the reason for the 3 continuous years of epidemics and to find countermeasures. Through analysis, it is understood that after upland wheat harvest, the grains left in the field produce self-sown wheat seedlings which serve as hosts for the oversummering stripe rust pathogens. Under the weather condition of warm winters and cool summers, wheat crops may be seen all year long to provide a favorable ecosystem for the stripe rust. It is suggested that this continuous cropping cycle must be broken off, i.e. the fall wheat crop should be omitted. Further clarification of stripe rust resistance of various breeds and the use of drugs to produce temporary relief from the disease are also acknowledged to be necessary.

AUTHOR: YANG Changshou [2799 2490 1108]

ORG: None

TITLE: "Preliminary Viewpoints Concerning the Problem of Prevention and Control of Wheat Stripe Rust in Yunnan Province"

SOURCE: Kunming YUNNAN NONGYE KEJI [YUNNAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 5, 25 Sep 81 pp 15-19, 4

ABSTRACT: Following 1963, 73, 79, and 80, 1981 is another year of heavy damage from stripe rust in the wheat producing region of central and western Yunnan. The disease spread to 2.7 million mu to create a loss of 150 million jin of wheat. The author analyzes the increasingly severe problem of stripe rust from the viewpoints of ecology, epidemiology, breeding technique, and breed application. Based upon the analysis, the author maintains that the basic strategy for the prevention and control of wheat stripe rust is a reasonable utilization of disease resistance of the host, i.e. breeding disease resistant varieties. Unfortunately, due to mutation of pathogens, a newly introduced disease resistant breed often loses its resistance in a few years. From either the theoretical or the practical viewpoint, therefore, in regions of wheat stripe rust, the quantity of self-sown wheat should be reduced and cropping summer and autumn wheat should be avoided so as to provide a closed season in the relationship between the host and the pathogens. This is also a major, and unavoidable measure for controlling wheat stripe rust.

6248
CSO: 4009/95

AUTHOR: WANG Dongsheng [3769 2639 0581]
TIAN Ronghe [3944 2837 0735]

ORG: Both of Research Institute of Hydrogeology and Engineering Geology, Ministry of Geology

TITLE: "On Chemical Classification of Ground Water With Electronic Computer"

SOURCE: Beijing SHUIWEN DIZHI GONGCHENG DIZHI [HYDROGEOLOGY AND ENGINEERING GEOLOGY] in Chinese No 5, 15 Sep 81 pp 30-33

ABSTRACT: Chemical classification of ground water, i.e. in accordance with its chemical composition, is an important method of revealing the distribution and the principle of formation of the chemical elements in ground water. Traditional chemical classification methods belong to a qualitative concept system, using mostly the 6 basic ions of $Cl^-$, $SO_4^{2-}$, $HCO_3^-$, $Na^+$, $Mg^{2+}$, $Ca^{2+}$ as the index. The use of electronic computer has made it possible to introduce the numerical, or quantitative technique. The result of numerical classification produces statistical types which must await geochemical interpretation, however. A system of nomenclature based upon some major variables and measures of historical analyses and model experimentation should also be adopted to establish an internal link among statistical, hydrochemical, and genetic types to complete the work of numerical classification and interpretation. Using this new technique to classify the ground water of the Zigong District of the Sichuan basin is the experimental study by the authors reported in the paper. This paper was received for publication in Jul 80.

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TITLE: "A Study of Alkali-fresh Water in Hebei Plain"

SOURCE: Beijing SHUIWEN DIZHI GONGCHENG DIZHI [HYDROGEOLOGY AND ENGINEERING GEOLOGY] in Chinese No 5, 15 Sep 81 pp 34-39

ABSTRACT: There is, by no means, a consensus concerning the definition of alkali-fresh water. For the purpose of discussion, alkali-fresh water must be $\gamma HCO_3^- > \gamma (Ca^{2+}+Mg^{2+})$, pH >8.3-8.4, $HCO_3^- + CO^{2-}$ >25-30 percent, sodium salts content > 70 percent, however. Aside from the problem of insufficient supplementation, the use of the alkali ground water for irrigation has caused obvious alkalinization of soil in some regions of the Hebei Plain, mainly due to decomposition of some $HCO_3^-$ ions in the sun to bond with $Na^+$ ions to produce $Na_2CO_3$. The hydrogeological condition of the alkali-fresh water region and its characteristics are analyzed. Experimental data with regard to the ion content, the ion ratio coefficient, and changes of ion relationship of alkali, saline, and mixtures of various ratios of alkali-fresh and saline-fresh, and fresh water are reported.

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TITLE: "Saline Water in the Eastern Part of Houtao Plain in Nei Menggu"

SOURCE: Beijing SHUIWEN DIZHI GONGCHENG DIZHI [HYDROGEOLOGY AND ENGINEERING GEOLOGY] in Chinese No 5, 15 Sep 81 pp 40-42

ABSTRACT: The Houtao Plain includes the western part of the Wulateqian Banner and the eastern part of Wuyuan County, being the lowest of the entire Houtao basin. The geological structure of the plain is complex and there are several neotectonic faults. The area of distribution of saline water is vast to cover more than half of the plain while in the other half, the water is mostly fresh in the upper layer and saline in the lower layers. This paper reports the geotectonic condition of the plain, the distribution of saline water, the hydrochemical characteristics of the ground water, and an analysis of the genesis of the saline water. Results of analyses of water samples of various points of the salt lake, bore holes, drainage ponds, etc. are included.

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TITLE: "Regional Ground Water Resources and Their Calculation in the Loess Region of Luochuan"

SOURCE: Beijing SHUIWEN DIZHI GONGCHENG DIZHI [HYDROGEOLOGY AND ENGINEERING GEOLOGY] in Chinese No 5, 15 Sep 81 pp 43-46

ABSTRACT: Within the Luochuan region, the thickness of the loess varies from 30 to 148 m. Many holes, fissures, and crevices are distributed to provide the condition for the accumulation of ground water. Atmospheric precipitation is the only source of supplementation; the average is 553.7mm/year, with half of it concentrating in Jul-Sep. The evaporation is 1800-2000mm, however. This paper describes briefly the hydrogeology of the region before reporting the calculations of the natural resources of ground water and the runoff modulus which is 6 percent. The quantity of water resources available for development and utilization is, therefore, very limited, the paper concludes, and reasonable utilization and conservation are the only recourse.

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TITLE: "Determination of Hydrogeological Parameters of Phreatic Water Aquifers With Their Regime Observation Data"

SOURCE: Beijing SHUIWEN DIZHI GONGCHENG DIZHI [HYDROGEOLOGY AND ENGINEERING GEOLOGY] in Chinese No 5, 15 Sep 81 pp 47-51, 53

ABSTRACT: Based upon the observational data of several years of the shallow groundwater of several pluvial fans of Shanxi Province, the author introduces a method of using dynamic observational data to determine the water table variation supplement $\mu$, the water conducting coefficient $T$, and the precipitation seepage input of phreatic water aquifers $\alpha$. At present, for the first 2 parameters, field water pumping tests are mostly used, but due to localized unevenness or incomplete data gathering, etc. the margin of error is often very great. In case of precipitation seepage, empirical value is often used. On the basis of the empirical equation which has been successfully applied in Henan, Anhui, Shandong, etc. by $\varepsilon = \varepsilon_0 (1 - \frac{\Delta}{\Delta_0})^n$ some Chinese scientists to derive the 3 parameters, the author decides to adopt and amplify it. The theory of the method and sample computations are given. Aside from requiring more than one year's observation data, the method also has some limitations, which are briefly discussed also.

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TITLE: "Artificial Recharge of Ground Water in the Changxindian Region of Beijing"

SOURCE: Beijing SHUIWEN DIZHI GONGCHENG DIZHI [HYDROGEOLOGY AND ENGINEERING GEOLOGY] in Chinese No 5, 15 Sep 81 pp 53-56

ABSTRACT: Changxindian is located in the southwest of the city of Beijing. It has an average rainfall of 633mm, concentrating in Jul-Aug. Originally, Xiaoqinghe flowed through it to provide the water for the vegetable gardens along the banks. In 1959, an earthen dam was constructed in the upper reaches and the river bed of the lower reaches has since been used for irrigation in Fangshan County. In the spring of 1964, the water level of the wells in Changxindian fell suddenly, and the water supply for agriculture and daily living was seriously affected. Related departments of the city government decided to develop artificial recharge of the ground water. The recharge practice of more than 10 years proved that although the industrial wells remain deficient, the water level of the farm wells has risen considerably. Although the Dayu Reservoir, which is the source of the recharge water, is suffering from continuous silting and its capacity has been greatly reduced, the method of recharging reported in the paper and the result are still significant.

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TITLE: "Discussion on Some Aspects of Water Balance Method for Evaluating Ground Water Resources"

SOURCE: Beijing SHUIWEN DIZHI GONGCHENG DIZHI [HYDROGEOLOGY AND ENGINEERING GEOLOGY] in Chinese No 5, 15 Sep 81 pp 71-76

ABSTRACT: There are many techniques of evaluating ground water resources but at present some organizations frequently adopt the multiple year water balance method, which in the opinion of the authors is in need of improvement. Problems concerning the method discussed in the paper include the starting year on the calendar and the starting depth of the ground water for the purpose of calculation, effects of the depth of the ground water on major balancing factors, and the calculation of the maximum depth of the ground water. In case of the starting date, the paper suggests that the use of the interpolation method, i.e. selective use of high water level, flat water level, and low water level years to produce a variation curve and a mean. With respect to the depth, the ground water depth requirements of major crops, the short duration permissible depth, the critical depth for salinization prevention, the aquifer evaporation limit depth of various types of soils are among the problems discussed and methods of calculation provided.

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TITLE: "Interpretation of Aerial Photographs of Cultivated Soils and Their Secondary Salinization in Irrigated Areas of Xinjiang Province"

SOURCE: Shenyang TURANG TONGBAO [JOURNAL OF SOIL SCIENCE] in Chinese No 4, 5 Aug 81 pp 19-21

ABSTRACT: Cultivated soils of irrigated oases of Xinjiang, being products of prolonged production activities of men, are influenced by the location, cultivation, and fertilizer application, so far as their degree of secondary salinization is concerned. Soils farther from irrigation channels and population centers are less mature and more severely salinized. For the purpose of interpreting the degree of salinization, the authors suggest the following indices: (1) When the average saline content of the 0-20cm layer is less than 0.2 percent, the soil is not salinized, the fields are clearly visible and there are no white or gray salt spots; (2) When it is 0.2-0.5 percent, only large fields are visible and salt spots cover about 10-15 percent of the area; (3) When it is 0.5-1.0 percent, only about half of the fields are visible and salt spots cover about 20-30 percent; (4) When it is 1-2 percent,

[continuation of TURANG TONGBAO No 4, 81 pp 19-21]

most of the fields cannot be distinguished from one another, salt spots may cover 50 percent of the area, and the soil is so severely salinized that only small areas are cropped. The composition of the salts may also be directly or indirectly observed on the photogammetric mosaics. For example, $NaCl$, $MgCl_2$, $CaCl_2$ are very soluble and they cause the ground surface to be damp and in a dark gray color. The white colored spots are mainly $Na_2SO_4$, which forms a hard crust on the gound surface and is highly light reflective. Aerial photos are reproduced to illustrate soils of various degrees and types of salinization.

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TITLE: "Trend of Nitrogen Mineralization of Major Cultivated Soils in Shaanxi Province"

SOURCE: Shenyang TURANG TONGBAO [JOURNAL OF SOIL SCIENCE] in Chinese No 4, 5 Aug 81 pp 26-29

ABSTRACT: In 1972, Stanford and Smith (S.S.S.A.P. Vol 36 pp 465-472) proposed the concept of soil nitrogen mineralization tendency. Since then, numerous studies by these and other scientists have proved that soil nitrogen mineralization (No) may be used as an index to assess soil nitrogen fertility. Samples of 20 types of cultivated soils of Shaanxi Province are tested with the Stanford and Smith technique to determine the quantity of nitrogen produced from mineralization periods of 2, 4, 7, 10, 14 cycles. The No values of these samples thus obtained are reported. For the purpose of further clarifying the soil nitrogen mineralization process, its nitrogen supply characteristic, and the effect of different thermal and water conditions on the mineralization speed constant, further study is planned.

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TITLE: "Effects of Accumulative Application of Organic and Inorganic Fertilizers on the Fertility of a Waterlogged Paddy Soil"

SOURCE: Shenyang TURANG TONGBAO [JOURNAL OF SOIL SCIENCE] in Chinese No 4, 5 Aug 81 pp 30-32

ABSTRACT: Different fertilizer application measures, including no fertilizer, all chemical fertilizers, organic fertilizer (green manure and pig manure) alone, and mixture of organic and inorganic fertilizer, are used in a 3-year continuous experiment to determine the effects on the yield of Qingzini soil, a waterlogged paddy soil typical of the Qingpu County Institute of Agricultural Sciences Farm. The section of mixed application of organic and inorganic fertilizer produced the highest yield in all seasons except for the first season when the yield was slightly lower than the section of chemical fertilizer application. The nitrogen absorption and the nitrogen utilization rate of 4 rice growing seasons in 1978-80 of the different sections of different fertilizer application measures are reported and analyzed.

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TITLE: "A Study of the Effect of the W-Type Manuring Process on Improving the Productivity of the Rice Plant"

SOURCE: Shenyang TURANG TONGBAO [JOURNAL OF SOIL SCIENCE] in Chinese No 4, 5 Aug 81 pp 33-34

ABSTRACT: This paper reports experiments carried out in 1975-77 to compare effects of V, A, and W types of fertilizing process on the growth and yield of paddy rice. The V type emphasizes basic fertilizer to promote tillering and nitrogen is withheld in the middle stage of growth and lightly applied in the late stage. This has been the adopted method since the late 50's. The A type deemphasizes the initial application and applies heavily to promote growth of the middle stages; experimental yield increase results have been reported in recent years. The W type narrows the difference of the quantity of fertilizer applied in the 3 or 4 stages. The success in producing nodular chemical fertilizer for deep layer application in the 70's has made the W type feasible. Compared with fast acting liquid nitrogen, as demonstrated in 13 experiments, the nodular fertilizer produced a yield increase of 11.7 percent, yet there was also an accompanying increase of 15.4 percent of straw. Nodular fertilizer has, therefore, made the shortcomings of the V type even more obvious. Experimental results supporting the superiority of the W type are detailed.

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